BOSTON RAILWAYS:

THEIR

CONDITION AND PROSPECTS.

BOSTON:
LITTLE, BROWN, AND COMPANY,
112, WASHINGTON STREET.
1856.

THE deep interest of the community in the success of Boston Railways, and the belief that a suicidal policy prevails in their management, have led to the publication of these pages, with the hope that railway shareholders may investigate the causes of the present condition of their property.

E. B. GRANT.

BOSTON, December, 1856.

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BOSTON RAILWAYS.

If there be doubts in the mind of any person whether the introduction of railways into Massachusetts has proved of pecuniary benefit to the community, or the reverse, it would seem that intelligent observation must clearly demonstrate that they have been the chief instruments of the prosperity of the State. No one can refuse to acknowledge, that railways, by the increased facilities which they have afforded for travel and the transportation of freight, have been the principal contributors to the increase, not only of business and of population, but of material wealth. There can be no doubt that cheap transportation has given a ready market for the sale of the productions of agriculture and mechanics, that would not have existed otherwise; that thousands of acres of land have been put under cultivation, and made productive of income, which otherwise would have lain fallow; that numberless waterfalls, which for untold ages had contributed nothing of their unemployed power to the comfort and support of man, have been wakened into usefulness solely through their agency.

If the agriculturist distant from a market has, in effect, been brought near to it by the all-embracing and space-annihilating railroad; if he has been thereby enabled to supply the tables of the capital with the products of his skill in husbandry, — it is not, as many have declared, at the expense of those producers whom long possession of the monopoly of supplying city consumers had taught to consider as their right; for the increase of business and of population effected by railways has so enlarged consumption, that a perusal of the market price-current cannot fail to show that consumers have more than kept pace with producers.

The manufacturing cities and towns of the interior, most of which were called into being by railways, are so many central markets, in which the neighboring farmer finds ready sale for his produce. Hence the increased valuation affixed to the real estate of the Commonwealth is not fictitious; for it is based upon income which railways have created.

The rapidly increasing population of Boston, consequent upon the enlarged business of the State, has induced people to avail themselves of the facilities of railway travel to leave the crowded streets of the city, after the business of the day, and make their homes in the country.

Distances diminish in the ratio of the speed of travel; and railways have enlarged the area of territory within an hour's ride of Boston more than one thousand per cent. Thus, at a speed of six miles an hour, the area of territory whose centre is accessible within

an hour is thirty-six square miles: but, at a speed of twenty miles an hour, it is four hundred; and, at a speed of thirty miles an hour, it is nine hundred; and so on. Hence the value of land in the vicinity of Boston has vastly increased, not, as is often asserted, at the expense of real estate in the city; for enlarged business has increased its value in as great a ratio as that of the country.

If it be true, then, that railways have tended to develop the previously concealed resources of the State; if they have added to the comfort, the convenience, and wealth of its inhabitants, — ought not they whose enterprise and public spirit led them to embark vast sums of money in a system, which, at its inception, was looked upon not only as an experiment, but, in the opinion of most, as a foolish, ill-considered, and Quixotic undertaking, — ought not they to receive some return from the community they have so richly benefited? Are they not entitled to an ample toll upon the vast traffic their enterprise has called into existence? No fair-minded man can deny that they are entitled to liberal remuneration for the capital they have invested; and I believe no man does deny it.

But, in granting charters to railway companies; in giving them the right of way through lands, regardless of the owners' remonstrance; in permitting them to enjoy a comparative monopoly of transportation, — the Legislature was governed by what it conceived to be the public good; and, in order that the monopoly might never become too burdensome to the com-

munity, the right was reserved to take the property, after a limited number of years, by paying the proprietors their capital invested, and ten per cent for the annual use of the same; *also the power to reduce the tolls.*

It is maintained by some railroad directors, that, this contingency not having yet arisen, the Legislature has no right to interfere with their concerns; that they have the right to affix their own tolls upon passengers and freight, and are entirely above all legislative intervention; that Government has no more right to interfere with their affairs, and arrange their tariffs, than it has to dictate to an individual the price at which he must sell his commodities. But a railway corporation is not a private, it is a public, institution: the breath of the Legislature made, and can destroy it. For the public interest, extraordinary privileges were granted; for the public interest, those privileges may be modified or taken away.

If it can be clearly shown that the seven railways terminating in Boston have failed to pay the dividends which the law allowed them only because of great mismanagement; if it can be proved that they are now on the high road to the most triumphant pecuniary success, *in spite* of past and present mismanagement; if, moreover, it can be conclusively demonstrated, that, notwithstanding the injudicious policy heretofore pursued, these roads have yet made a much larger percentage of profit than has rewarded the great bulk of capital otherwise employed in this State; if all these *facts* can be made apparent, — the Legislature will

surely protect the public against the proposed radical change of tariffs. Government will not allow the people to be taxed and incommoded merely to enable railway corporations to pursue the course of reckless extravagance, which, although checked in a degree, still prevails to an extent sufficient to warrant the Legislature in insisting, that, before applying the supposed panacea of higher fares and fewer trains, now so popular among railroad men, a trial shall be made of a system of judicious economy.

The public expect and desire to pay liberally for the great accommodation which they acknowledge railways afford them; but they distinctly, decidedly, and emphatically object to having the blunders and extravagances of directors set down to their debit in "running expenses."

All must acknowledge, that, unless amply paid for their service, railways cannot accommodate the public.

It is equally clear, that, unless the public are accommodated, they will not pay the railways.

But some railroad directors say, — there are wise and honorable exceptions, — "The public will *have* to make use of railways; there is no way in which they can travel so rapidly, so cheaply, or so comfortably; and we mean to make them pay roundly for the privilege," — a privilege, by the by, which the people had retained for themselves in exchange for the privilege of monopoly granted by them in chartering railway companies.

And it is unquestionably true, that so great is the

convenience of railways, and so necessary have they become to our community, that, if tariffs were advanced fourfold, a portion of their traffic would still be retained.

Having written thus much, I shall proceed to substantiate some of my assertions.

First, to prove, if proof be needed, that railways have been of benefit to Massachusetts, I append a schedule, showing the increase of population in the State: —

Population of Massachusetts and rate of increase from 1790 *to* 1855.

1790.	1800.	1810.	1820.	1830.	1840.	1850.	1855.
378,717	423,245	472,040	523,287	610,408	737,699	994,514	1133,123
Inc.	11.75	11.52	10.85	16.64	20.85	34.81	*27.87

* At that rate for a term of ten years.

Population of Massachusetts within the arc of a circle with a radius of thirty miles from Boston, including all towns intersected by the arc, from 1830 *to* 1855.

Counties.	1830.	1840.	Inc.	1850.	Inc.	1855.	Inc.
Bristol . . .	17,331	19,729	13.83	24,378	19.65	27,703	31.57*
Essex . . .	80,340	92,248	14.82	128,200	38.97	147,982	30.86*
Middlesex .	72,831	101,902	39.91	156,384	53.48	191,141	44.43*
Norfolk . .	41,972	53,140	26.61	78,892	48.46	94,448	39.44*
Suffolk . . .	62,163	95,773	54.06	144,517	50.89	171,818	37.78*
Worcester .	21,982	25,027	13.85	29,947	19.65	34,672	31.57
Total. . . .	296,619	387,819	30.74	562,318	44.99	667,764	37.50*

* At that rate for a term of ten years.

Total increase in twenty-five years 125.12

The first railroads in Massachusetts were opened in

1835; and, between 1845 and 1855, the network was still further extended.

Population of Massachusetts within the arc of a circle with a radius of twenty miles from Boston, including all towns intersected by the arc, from 1830 *to* 1855.

Counties.	1830.	1840.	Inc.	1850.	Inc.	1855.	Inc.
Bristol . . .	2,928	3,456	18.03	4,126	19.38	4,867	35.90*
Essex . . .	39,761	46,427	16.76	61,883	33.29	72,215	33.38*
Middlesex .	58,990	72,996	23.07	113,054	54.89	144,753	56.96*
Norfolk . .	40,870	52,085	27.44	77,611	49.00	93,035	39.76*
Suffolk . . .	62,163	95,773	54.06	144,517	50.89	171,818	37.78*
Total. . . .	204,712	270,737	32.25	401,191	48.18	486,688	42.62*

* At that rate for a term of ten years.

Total increase in twenty-five years 138.71

Population of Massachusetts within the arc of a circle with a radius of ten miles from Boston, including all towns intersected by the arc, from 1830 *to* 1855.

Counties.	1830.	1840.	Inc.	1850.	Inc.	1855.	Inc.
Essex . . .	25,838	31,274	21.03	45,905	46.78	50,271	19.02*
Middlesex .	33,796	44,109	30.51	75,061	70.17	97,999	61.10*
Norfolk . .	26,986	36,529	35.36	58,175	59.25	70,662	42.92*
Suffolk . . .	62,163	95,773	54.06	144,517	50.89	171,818	37.78*
Total. . . .	148,783	207,685	39.58	323,658	55.84	390,750	41.44*

* At that rate for a term of ten years.

Total increase in twenty-five years 162.63

Exhibiting the proportion per cent of population of Massachusetts to the whole number in the State, from 1830 *to* 1855, *within certain radial distances from Boston, as explained in preceding tables.*

	10 miles.	20 miles.	30 miles.
1830	24.37	33.53	48.59
1840	28.15	36.	52.57
1850	32.54	40.34	56.54
1855	34.48	42.95	58.93

Some of the most remarkable instances of growth in the case of individual towns.

Towns.	1830.	1840.	1850.	1855.
Boston	61,392	93,383	136,881	160,508
Chelsea	771	2,390	6,701	10,151
Haverhill. . . .	3,896	4,336	5,877	7,940
Lawrence. . . .			8,282	16,081
Lynn	6,138	9,367	14,257	15,713
Brookline . . .	1,043	1,365	2,516	3,740
Dedham	3,117	3,290	4,447	5,640
Dorchester . . .	4,074	4,875	7,969	8,357
Quincy	2,201	3,486	5,017	5,921
Randolph . . .	2,200	3,213	4,741	5,538
Roxbury	5,247	9,089	18,364	18,477
Stoughton . . .	1,591	2,142	3,494	4,369
Weymouth . . .	2,837	3,738	5,369	6,530
Brighton	972	1,425	2,356	2,895
Cambridge . . .	6,072	8,409	15,215	20,473
Lowell	6,474	20,796	33,383	37,553
Malden	2,010	2,514	3,520	4,591
Medford	1,755	2,478	3,749	4,605
Melrose			1,260	1,976
Natick	890	1,285	2,744	4,138
Newton	2,376	3,551	5,258	6,768
Somerville . . .			3,540	5,806
Stoneham . . .	732	1,017	2,085	2,518
Waltham. . . .	1,857	2,504	4,464	6,049
Woburn	1,977	2,993	3,956	5,451
Grafton	1,889	2,943	3,904	4,409
Milford	1,360	1,773	4,819	7,489

It requires no argument to prove that a railway will succeed better through a populous than an unpopulous district; and the preceding tables prove that the effect of the railway system is to consolidate the population of the State about the capital.

Valuation of real and personal property in Massachusetts from 1830 *to* 1850.

1830	$197,561,191.21
1840	299,878,329.31
1850	597,936,995.46

I shall next attempt to demonstrate, that, while benefiting the State, railways have received a fair return for the capital invested, by presenting a table of dividends paid by the seven roads: —

Table showing dividends paid by the seven roads terminating in Boston, to and including January, 1856.

Name of Road.	When finished.	Av. divs. 11 years.	Av. since comm.
Boston and Lowell	1835	7.04	6.91
Boston and Maine	1842	7.09	6.96
Boston and Providence	1835	5.63	6.11
Boston and Worcester	1835	7.36	6.85
Eastern	1840	6.59	6.38
Fitchburg	1845	6.86	6.86
*Old Colony and Fall River	——	*	6.*

* This Company was formed, in 1854, by the union of the Fall River and Old Colony Railroad Companies. In the seven years preceding the union, the Fall River paid to its stockholders average dividends of 5.71. When the union was effected, the stockholders of the Fall River received a dividend of thirteen dollars per share, payable in the stock of the consolidated Company. In the same time, the stockholders of the Old Colony had received average cash dividends of 3 per cent, and a dividend in the stock of the united companies of nearly twenty-three dollars per share. The present condition of the new Company will be shown hereafter.

I shall next undertake to maintain the assertion, that these roads are at present doing well, by presenting the history of the several roads, gleaned from their own reports.

BOSTON AND LOWELL, — COMPLETED IN 1835.

The stock of this Corporation for a long time stood at the head of the list of railways in Massachusetts; having sold, in 1835, at 135 per cent. For a period

of fourteen years, from 1839 to 1853, it was not sold for less than four per cent, ranging from that point up to thirty-two per cent advance. It is at present worth in the market but seventy per cent of the par value, owing to the prevalent, but for the most part unfounded, distrust of the value of railway property as an investment.

Of the gross income in 1855, $66\frac{1}{10}$ per cent was derived from business confined to their road alone. Of the gross income from passengers, $82\frac{8}{10}$ per cent was derived solely from their road. Increase of income on their own line, on entire receipts, 1854, $13\frac{2}{10}$. Decrease of income from connecting roads, on entire receipts, 1854, $2\frac{8}{10}$. From these facts, it would seem a fair inference that the local business on *this* road is worth cultivating. The Directors state that "all expenses, of every description (many of which were for permanent improvements), excepting those for the extension into the city of Boston, have been charged to running expenses." Notwithstanding which, they have made a clear profit of $6\frac{76}{100}$ per cent.

The property held by this Corporation, beside their track, consists, in part, of —

130,000	feet	upland	Boston,
30,000	„	wharves	„
440,000	„	upland	East Cambridge,
780,000	„	flats	„ „
40,000	„	wharves	„ „
88,000	„	upland	Lowell,

of a superabundant equipment; of buildings, "well

adapted to the present and prospective wants of the Company," all in perfect order, and with an affixed valuation "supposed to be entirely within the actual value of the property;" of $10,450, bills receivable; of $6,509.37, cash; of $110,006.60, in "wood, materials, &c., on hand." This would seem to indicate a very tolerable and desirable degree of prosperity, particularly when taken in connection with the fact that they have paid, within the last eleven years, $1,408,650, in dividends, or an annual average of 7.04 per cent; while the cost of their road has been increased but $255,997.61; of which sum, $179,705.97 has been expended for the further acquirement of real estate in Boston, and the extension of their line to Causeway Street. Their gross income exceeded that of 1854, $47,263,20; their net income, $45,625.95. It would thus seem that there is ground for hope that the Boston and Lowell Railroad may yet be made a profitable concern; for, while they have paid but little over seven per cent the last eleven years, a gain in the years 1856 and 1857, corresponding with that in 1855, would enable the company to pay ten per cent.

It is therefore a matter of surprise that its leading Directors have the boldness, to use a mild expression, to advocate "a material advance of tariffs."

BOSTON AND MAINE, — COMPLETED IN 1842.

The policy pursued by the Boston and Maine Railroad towards the public has always been most liberal; and the astonishing success attained in peopling their line of road is a sure proof of the soundness of that policy.

The Boston and Maine refused to join in the last general advance of passenger tariffs on roads leading from Boston. They have since decided to do so, however; and, if the advance be moderate, they will doubtless increase their net income thereby. Their tariff was unquestionably too low for present profit; although the loss consequent upon their refusing to advance will doubtless prove a good investment. Yet, in spite of a remarkable series of disasters by fire and flood in the early part of the last financial year, which, beside the expense of repairs, for a time seriously interrupted the business of the road; notwithstanding large expenditures for "new structures and improvements," and a heavy outlay for new machinery, — all of which were charged to running expenses, — in spite of low fares, and high prices for labor and materials; the net earnings of the road were $7\frac{94}{100}$ per cent.

The freight business of this road is large, and constantly increasing, and, when the projected improvements for its economical transaction are completed, will be highly remunerative.

As a passenger-road, it stands at the head, and, while managed with its present enlightened policy, will doubtless remain so.

As a proof that this road is no exception to other Massachusetts roads, in the superior importance of its local, compared with the through traffic, it may be mentioned that $69\frac{8}{10}$ of their business is solely from their own line, and $30\frac{2}{10}$ from connecting roads.

In regard to short travel, the value of which has been so contemptuously spoken of by the managers of another line of road, — the fruits of whose niggardly policy under its present government are now made manifest by a loss of 17 per cent of its passengers in a single year, — the value of this short travel is abundantly demonstrated by the fact, that, on the first thirty-three miles out of Boston, being only 44 per cent of its entire length, the gross receipts were 58 per cent of the income from its own line.

It is simply an act of justice to the accomplished head of this road, that the community acknowledge their indebtedness for the admirable manner in which his duties, both as Engineer and as President, have been discharged. It is acknowledged by all conversant with the history of this road. I shall quote the valuable opinion of one of the most experienced and accomplished railroad men of the day to substantiate the justice of the acknowledgment I claim for him: —

"It [the Boston and Maine Railway] has had the rare fortune to be guided by one master-mind. The engineer, Mr. James Hayward, combined science with judgment, thrift, and experience.

. . . . "The line has been fortunate also in its Presidents and Directors. Since its first movement from Andover, there has been no sudden or sweeping revolution as in other railways. The earlier Presidents, Messrs. West, Howe, and Shaw, were men of sagacity and intelligence, and enjoyed the confidence of the stockholders. When wearied by arduous duties, they voluntarily sought retirement; and now their duties have devolved on a fitting successor, — Mr. Hayward.

. . . . "There are certain tests by which we can measure the success of a railway. *First*, Has the trust confided by the State been faithfully discharged? Railway companies are, by the theory of our laws, trustees, to whom is intrusted, for the public good, a virtual monopoly of the public travel. In the name of the State, they exercise the right of eminent domain, appropriate land at their discretion, and regulate the hours and rates of transportation. *Their compensation is but a commission upon the execution of a trust.* And when a company like the Boston and Maine has traversed a neglected district, conducted its works with skill and economy, conciliated the people, provided them with improved and safe modes of conveyance at the most moderate scale of charges, waked into life the useless waterfalls, built up flourishing villages and cities, and made the wilderness blossom like the rose, it certainly has effected one great object of the railway system, and safely laid the foundations of prosperity." . . .

By the annual returns to the Legislature, we find, that, in the last six years, its passenger-travel has increased 53, and its freight 71, per cent.

The road has been kept in perfect order; renewals have kept pace with depreciation; its capital has remained stationary for the last six years; its debt is but $150,000, which is funded; its surplus is now $228,897.93.

It has paid, since its opening in 1842, 6.95 per cent average annual dividends, besides having largely increased its undivided property, both real and personal.

Nothing can be more certain, under its present management, than a continuation of its popularity, and consequent speedy return to its former large dividends.

BOSTON AND PROVIDENCE RAILROAD, — COMPLETED IN 1835.

The history of this Corporation proves that its general policy has not been discreet. Built mainly with a view to secure the New-York travel, its line was run in the most direct practicable line to Providence, and, as time has shown, injudiciously avoiding towns whose large traffic it has since been thought necessary to secure by the construction of expensive branches.

For five years after its completion, it enjoyed a monopoly of the New-York travel; receiving about five cents per passenger per mile, and twelve and a half cents per ton per mile for freight. In the year 1839, its net profits were twelve per cent on the capital.

But, as is often the case, too much prosperity unduly elated the Directors with the success of their supposed monopoly; and little or no disposition was manifested to secure popularity by deserving it. The Norwich and Worcester Railroad, warmed into existence by the unconciliatory course pursued by the Providence Road, commenced running early in the year 1840, and, by their rivalry, diminished the net

earnings of the Providence fifty-three per cent in a single year. They were compelled to reduce their tariffs; and the result was a steady increase in receipts, until, in 1846, they renewed the payment of eight per cent dividends.

In the yearly report to the Legislature for the doings of the year 1840, the Directors state, that "having been obliged to reduce their passenger fare to Providence, to $1.50, and their freight to $3, and in the same ratio for intermediate places, they found it necessary to encroach upon the reserved fund to pay the July dividend; *but, in the last six months, the increase of business was such as enabled them to declare a dividend exclusively from the profits accrued in that time.*" Picture their astonishment, — actually making more money at the reduced price than they had before at the high fares; girding themselves up for a deadly competition with a rival; prepared to submit to great sacrifices, that they might, after slaying their enemy, renew their monopoly; and finding, to their utter amazement, that the increased travel called out by low fares more than counterbalanced the diminished profit on each passenger!

Again elated with their increasing revenue, this all-grasping Corporation expended more than a million of dollars upon branches, from which, as yet, no important return has been reaped.

The business on the road is increasing slowly, but steadily; the gross receipts for 1855 exceeding those of any former year. The tariff on this road has doubtless been too low, and a moderate advance might well

have been made; but the sudden *revolution* in the system, effected by a rise of fifty per cent on commutation, and twenty per cent on single tickets, cannot fail to exert a most unfavorable influence upon the future prosperity of the Corporation. For the first year, the net income will doubtless increase; but the growth of the line will not only cease, but retrograde.

Attachment for the homes they have selected will for a time retain most householders. The first loss of passengers to the road will be of young men, who can, without loss or serious inconvenience, refuse to submit to what they deem a needless and exorbitant advance. But, after a time, the increased tax will have its effect upon the heads of families, and they will be reluctantly compelled to seek other abodes. There are many families on this road who pay $200 per annum to the Corporation for themselves and families, and would cheerfully continue to pay it; but the advance to $300 will surely, in many instances, amount to prohibition.

But let us see what necessity existed for this radical change of tariff.

The average annual dividends, since its completion, have been 6.11.

For the eighteen months ending Nov. 30, 1855, the renewals are declared to have fully covered depreciation; yet the following items are charged to expenses: —

To credit of fund to meet depreciation of iron, sleepers, and bridges (already met by renewals) . .	$17,390.91
Depreciation of cars and engine (also met by renewals)	24,247.55
	41,638.46
To which add net profits, as per treasurer's books .	267,013.84
Net earnings, 18 months	$308,652.30

Being equivalent to $6\frac{51}{100}$ per cent per annum.

Although figures in the Annual Report apparently substantiate this fact, yet I defy any man to form any certain conclusion as to the actual condition of the Corporation, from reading that document. Not one word is said in relation to the construction account, neither is any trial-balance presented.

As to the recent Report of the Investigating Committee, although a great deal is said in regard to the increase of Construction Account, but slight mention is made of the causes which led to it, or of the additional property acquired thereby, save the chronicle of an unhappy investment of $90,000 in Fishkill stock, another of $40,000 in the stock of a branch road, and still another of $45,639.72 in a Virginia plantation.

But there is one thing most conclusively proved by the Report of the Investigating Committee: That it is to "entangling alliances," which may be broken; to unprofitable contracts with connecting roads, which may be made profitable; to injudicious investments, — and not to low fares, nor commutation-ticket passengers, — that the present condition of the property is to be attributed. And yet from all these evils it was slowly recovering; and another year, even under the

old system, with its fares confessedly too low, would have put the Company out of debt, and have enabled them to resume their dividends. The present advance of rates cannot be maintained; and, before the Boston and Providence Railroad permanently resumes its former rank, the lesson of 1840 will have to be repeated. The introduction of coal-burning locomotives on the Boston and Providence Railroad would be productive of an immense saving.

BOSTON AND WORCESTER RAILROAD, — OPENED IN 1835.

The history of this road presents some most remarkable facts; proving not only the immense benefit which a well-managed railway may confer upon a community, but also the security of an investment in the stock of a corporation whose affairs are properly conducted. For although not wholly exempt from the errors that have beset other railways, many of which, from the peculiar circumstances of the case, were to have been expected, yet, upon the whole, their affairs have been well managed.

In the report of this Company to the Legislature, in 1836, it is stated that the road had been "partially opened for two years and nine months, and fully opened for a year and a half;" that, "during the

former period, they had transported nearly three hundred thousand people;" that "the Directors have felt it their duty to adopt every precaution which the novelty of the mode of conveyance would admit of for the safety of the persons so confided to them, as well as of persons travelling on the common roads."

In the year 1836, they made "two trips a day, and three in the summer."

Merchandise trains were sent at the rate of "one or more a day, or as often as is necessary." Freight from Worcester averaged about ten tons a day. It was deemed of so little consequence to the line, that it was proposed by a Director "to lease this branch of the business for little more than a nominal return." In 1855, the receipts from freight were $444,981.61. In 1840, the freight tariff was so high as to amount to prohibition, the business of the line was small, and the prospects gloomy. A Committee of Investigation, consisting of Messrs. Derby, Greele, and Lowe, reported, in effect, that *the way to increase the profits was to charge less, and afford better accommodation.* The Directors met their arguments with ridicule, and refused to listen to their suggestions. Nevertheless, before three years had elapsed, their recommendations were adopted, and the result is shown in table A, at the end of this pamphlet.

The receipts *for two years and nine months* after opening were $161,805.95.

In *the twelve months* ending Nov. 30, 1855, they were $1,008,004.90.

The number of passengers carried in two years and nine months was "*nearly*" 300,000.

The number of passengers carried in the *twelve months* ending Nov. 30, 1855, was 1,590,459.

In 1838, "out of 1,336 trips, only eight occupied more than four hours."

In 1840, "express trains were run to Worcester in *two hours.*" They are now run regularly in eighty-five minutes, and have been run in one hour.

In 1843, "special trains were run to Newton, three times each way, to accommodate the increasing population," then numbering about 3,300. The population of that town is now nearly 6,800.

In 1835, the population of Worcester was about 4,000; in 1855, it was 22,286.

Having thus shown that the public have availed themselves of the facilities offered by this line of road, and that the receipts of the Corporation have increased more than fivefold since its opening, it remains to be seen at what profit to the Company its vast business has been transacted.

The average annual dividends since its completion have been $6\frac{85}{100}$.

The average annual dividends for the last eleven years have been $7\frac{36}{100}$.

Dividends for 1855, $6\frac{50}{100}$.

Having thus shown what the Company have divided, it remains to show its present position: —

Since 1851, its construction account has been *reduced*	$51,000.00
The capital stands, as in 1848	4,500,000.00
Funded debt	500,000.00
Floating debt	155,428.78

The Directors say, on page 10 of their Report, "The net earnings of the year, without the allowance for depreciation, would be $8\frac{69}{100}$ per cent on the capital stock.

"This depreciation has not, of course, been the work of a single year. It relates back to the earliest history of the road, embracing the entire difference between the new and the old. In fact, since closing the construction account against increase, we believe the entire depreciation has been made good by renewals and enlargements during that period."

And again, on page 12 of the same Report, the Directors state, —

"The repairs of track, and renewals of iron, have claimed their full share of attention; and though the amount of new rails laid down has been less than the year before, as our last Report anticipated, we believe it has been fully equal to the wear of the year. The average renewals for the last two years would be 1,700 tons a year. At this rate, the entire track would be renewed every six and a half years. We believe seven to eight years a safe estimate for the average duration of a rail on our road, including the entire amount of the iron of the main road, branches, and side tracts.

"That our renewals have been sufficient, we are also confident, from a general inspection of the track. We believe, that, looking back to its condition in 1850 compared with the present, there is a manifest improvement of the condition of the iron, the sleepers, the road-bed, the mason-work, and the station-buildings, bridges, and other structures. If some of the buildings have decayed, as all wooden buildings must, that depreciation has been more than made good by new buildings erected where required by the establishment of new stations, or by the demand for increased accommodations, all of which have been charged to current expenses, and paid from the earnings. A large part of the masonry has been rebuilt, with firmer and better materials and workmanship. We can safely, therefore, assure you that the road has not depreciated, but, on

the contrary, has been gradually improved, and raised to a higher value."

The Company have a large excess of assets available to meet their indebtedness, without including real estate, not needed for railroad purposes, valued at $248,521.77.

A vast saving can be effected on this road in the item of fuel, not only by a more economical use of wood, but by the introduction of coal-burning engines; in relation to which, the Directors say, —

"The various experiments in operation for the use of coal as fuel, though none have yet been so decidedly successful as to induce their general adoption, give encouraging promise of final success, and great relief in this item of railroad expenses."

Intending hereafter to refer to coal as a fuel for locomotives, I shall, for the present, dismiss the subject.

The passenger business on this road is already very large, and constantly increasing; the policy of the Corporation in relation thereto has been liberal and judicious; the road is "popular" with the community, and the frequency of its trains has induced a great population to locate upon its line.

Its Directors apparently discern the fallacy of the arguments of those revolutionists in the system, who, with the most honest intentions, nevertheless advocate a system at once suicidal for railway corporations, and detrimental to the public; for, notwithstanding the present relative position of stockholders and passengers, the *true* interests of each are not antagonistic.

It appears, by the report of this railway, that —

The receipts per passenger per mile in 1855 were .	$2\frac{15}{100}$ cents.
The cost of transport was	$1\frac{21}{100}$ cents.
Profit on each passenger per mile	$\frac{94}{100}$ cents.

or nearly one cent per mile per passenger; a result sufficiently satisfactory to make it desirable to cultivate the further growth of the passenger traffic, — a cultivation well understood by the managers of this road, and not at all understood by the managers of a certain other Corporation.

Upon reviewing the history, the operations, and financial situation of this Corporation, it seems to me that one conclusion must be unavoidably attained, — that they have succeeded, and will continue to succeed. Their past success is a matter of record; and if for twenty-one years they have gone on steadily increasing their business, notwithstanding, since their birth, other roads, not then in existence, have come to claim a share of their travel, is it not certain that they will continue to increase, with the surety that no other rival *can* spring up to molest them?

Total receipts of the Boston and Worcester Railroad from 1851 *to* 1855 *inclusive.*

Year.	Passengers.	Freight.	Mail.	Rent.	Other Income.	Total.
1851	403,362.24	318,933.10	11,438.78	10,188.48		743,922.60
1852	424,713.73	314,943.27	7,962.60	9,650.87	1,549.00	758,819.47
1853	481,222.05	382,558.51	3,540.41	9,934.90	9,964.00	887,219.87
1854	512,764.71	405,498.70	15,946.50	7,729.37	10,956.00	952,895.28
1855	529,185.57	444,981.61	10,532.32	12,285.40	11,020.00	1,008,004.90

I close the review of the affairs of this Company with an extract from their last Report: —

"In our Report for 1851, we ventured to predict that our gross receipts would, at no distant period, amount to *a million of dollars*. We have, within the last year, reached and passed that limit, and within a shorter time than we should then have ventured to name. We see nothing in the future to exclude the hope of a similar increase. It results from causes likely to be permanent in their character; viz., the rapid growth, in population and wealth, of Boston and the towns on the line; the rapid development of the local business; the extension of trade and communication between Boston and the West; and the general prosperity of the Commonwealth."

EASTERN RAILROAD, — OPENED IN 1840.

In the Report of the Committee of the Legislature for 1836, to whom was submitted the application for a charter of the Eastern Railroad Company, it was stated that the number of stage-passengers annually, between Boston and Newburyport, and intermediate places, was 116,700; and it was believed that the opening of the railroad would double that number.

The charter was granted April 14, 1836; the work commenced; and on the 28th of August, 1838, the road was opened to Salem. In 1840, the line was completed to Portsmouth.

In order to show how fully the expectations of the projectors of the Eastern Railroad were fulfilled, I present the following —

Table showing the number of passengers between Boston and the towns specified, from 1840 *to* 1855, *in periods of five years.*

Miles from Boston.	Towns.	Estimated.	1840.	1845.	1850.	1855.
11	Lynn	8.400	66.790	107.977	157.726	142.286
16	Salem	155.000	146.065	192.488	250.686	146.824
36	Newburyport	60.000	19.673	37.959	43.022	32.641

It will thus be perceived that the expectations of the projectors in regard to long travel were not realized; while the enormous increase on short routes very far transcended their most sanguine hopes, as is *invariably* the case on railroads.

The Eastern is emphatically a passenger-road; and its principal revenue is from short travel, — Salem and Boston, and the intermediate towns, furnishing over one-half of the whole number of passengers. The travel between Boston and Salem alone is more than one-quarter of the whole.

The road is without high grades, or curves, the greater portion being a straight line and perfectly level. The advantage of these characteristics is exhibited in the comparatively low cost of operating the road.

There are numerous causes for the present depression in the market value of the stock of this Company, some of the chief of which I shall proceed to enumerate.

The prime cause of the Company's position, — in fact, the one to which all its reverses are clearly attributable, — is to be found in the competition carried on for many years with a powerful rival. A very large

amount of business was done, with but small profit at best, if not at an actual loss; and the Company have thus directly suffered from competition. But the loss indirectly arising from this ten years' war has been far more severe; and nothing will enable them to recover from its effects but the increase of business which the recently executed treaty of peace will enable them to develop.

Some of the evils indirectly arising from the deadly competition before referred to are to be found in the pecuniary aid afforded by the Eastern to other roads, which were expected to act as feeders to their line, and enable them to divert business from their rival.

In other cases, the Company, at heavy cost, became purchasers of short connecting roads, some of which have not, thus far, proved remunerative. It is believed, however, that they will eventually become so; but the Company have none the less suffered present inconvenience and loss therefrom.

Neither is the loss from the ascribed causes confined to them alone: for money thus invested was borrowed at high rates of interest; and, when the floating debt attained an unwieldy magnitude, it became necessary to fund it at a time of unparalleled depression in railroad securities, thereby involving a very serious additional loss.

The extension of the road into Boston, deemed by many an injudicious act, was hastened, if it were not entirely promoted, by the hope of more successful rivalry. Yet it seems there can hardly be a doubt that this expenditure will, in the end, prove a judi-

cious one, notwithstanding its magnitude: for it will create an entirely new business within six miles of Boston, which will eventually prove highly remunerative; and it will, moreover, largely increase the travel from Lynn and Salem.

In relation to the competition, that for so long a time prevailed between this road and its great rival, the Investigating Committee of the stockholders of the Eastern Railroad Company, in their remarkably able Report, presented July 30, 1855, say, —

"It cannot be denied, that depredation must be prevented and attack repelled; but, happily, we can see in the future no cause or occasion for any incursions upon our business, which, if they ever shall take place, must, while they injure us, bring ruin on their projectors. We believe that the reign of peace and harmony has now began; and we have no reason to doubt that the conflicting interests of this, and all other corporations located within the sphere and orbit of our business, will soon be composed and equitably arranged, finally and for ever."

Competition has added at least two millions of dollars to the liabilities of the Eastern Railroad Company. Yet it cannot be, nor is it, denied that the course pursued by former Directors was honestly believed by them to be for the best interests of the Corporation.

Railroad managers, however, at length acknowledge the folly of waging war with each other; and, in calculations for the future, this element of loss may be left out of the account.

The Company has also been a heavy loser by defalcations; the last embezzlement, to make use of the expression employed by the Committee of Investiga-

tion, " bursting forth in the full effulgence OF A QUARTER OF A MILLION OF DOLLARS."

It is clearly discernible, from a perusal of the history of the Eastern Railroad, that its present comparatively depressed condition is not to be attributed to low fares; on the contrary, it is apparent that it is upon low fares, properly applied, that all hope of future success is to be based. I am well aware, that, in many quarters, the statement which I am about to make, in regard to tariffs, will be received with sneering incredulity; yet I unhesitatingly declare that *passenger-fares are too high on the Eastern Railroad*, and shall attempt to prove the truth of the assertion in another portion of this pamphlet.

But let us see what is the present actual condition of the Company.

From the Legislative Railroad Reports for the year ending Nov. 30, 1855, and from other official sources, the following facts are gathered: —

Capital stock in Massachusetts . .	$2,853,400.00	
" " " New Hampshire .	492,200.00	
		$3,345,900.00
Funded debt		2,410,000.00
Mortgage to State of Massachusetts		500,000.00
Floating debt		539,737.13
Total liabilities		$6,795,637.13
Net income for eleven months, after deducting interest on debt		$162,739.78
Equivalent to $4\frac{84}{100}$ per cent for eleven months, or for twelve months		$5\frac{24}{100}$ per cent.

In the Report to the Legislature (1856), it is stated that $75,000 of the funded debt have been paid since

Dec. 1, 1855; consequently, the sum of $4,500, being the interest on the redeemed bonds, will not be chargeable to expenses for the present year. This would make the net income for 1856 (all other charges being the same) $5\frac{41}{100}$ per cent on the capital stock.

FITCHBURG RAILROAD, — OPENED IN 1845.

In 1842, a Committee of the Directors of the Fitchburg Railroad Company, Alvah Crocker and E. Hasket Derby, Esqs., were charged with the duty of preparing a condensed statement of the statistics and advantages of the proposed railway from Boston to Fitchburg.

They reported, that the route adopted was, in the main, the one selected by Loami Baldwin, in 1825, as most feasible for a canal from Boston to Fitchburg, thence to the Connecticut and Lake Champlain.

They reported that twelve stages daily entered and left the city by way of Waltham; that a Committee, appointed at a meeting of delegates held at Waltham, Jan. 11, 1842, had collected statistics from nearly all the towns on the line, from which it appeared that —

The annual tonnage was	38,758 tons.
Annual number of passengers	56,060 „
Amount paid annually for transportation of both . . .	$335,020

Further statistics were afterwards presented, which added "15,711 to the passengers, 8,980 to the tons of freight, and $81,454 to the amount paid for transportation, swelling the latter amount to $416,474."

The Committee, being "aware that some deduction must be made from this amount for the distance travelled between several of these towns and the proposed railroad," thought that they "erred on the side of moderation in estimating the receipts of the line, after its completion, at — $100,000 from passengers and mails, and $100,000 from freight — $200,000; and in estimating a rapid annual increase of the receipts."

The cost of the road was estimated at $850,844.82

The road was opened December, 1843, to Waltham.
June, 1844, to Concord.
October, 1844, to Acton.
December, 1844, to Shirley.
March, 1845, to Fitchburg.

Total earnings of the road to January 1, 1845 . . . $42,759.36

From May 1, 1844, to Jan. 1, 1845, number of passengers carried 82,182

Cost of road, Jan. 1, 1845 . . . . . $992,433.37

The Directors, in their Annual Report, January, 1846, remarked that "more than two-thirds of the business was way business;" a remark that more than holds good at the present day.

On the 1st of July, 1848, fares were reduced from three cents per mile to two and a half for local passengers, and from two and a half to two cents per mile for through travel. This was done principally with the hope of calling out a large passenger-

traffic from off the connecting lines, whose roads were about being opened for travel. The length of these lines amounted, in the aggregate, to over five hundred miles. It is not to be wondered at, that great expectations were indulged as to the amount of business they would influence; expectations, it is needless to say, which have but in a limited degree been fulfilled.

The Directors state: "With all these connections, we think that we hazard nothing in saying that there will be no lack of business or income to our road; and that our accommodations, now equal to any in the United States, will fall short of, rather than exceed, what will be required."

And they were right; but it was from the local line, and not from connections, that the business and income were to be derived.

Mainly with a view to accommodate this expected traffic, great additions had been made to construction. More than one million of dollars had been expended in two years, — for laying double-tracks; for land in Boston upon which to erect a new station-house; for new bridges, freight-houses, and increased equipment; also on account of the Lancaster and Sterling, and Watertown branches. Yet, notwithstanding the enlarged capital, reduced fares, a great depression in business, and a crisis in the financial world, their increased earnings enabled them to pay eight and a half per cent dividend, beside adding to contingent fund.

Their passenger-traffic increased materially in 1848,

under the impulse given by the low fares prevailing in the latter half of the year.

Construction was still further increased in 1849, in the sum of $524,989.95, for completion of double-track, branches, and extension into Boston; yet the Company divided eight per cent, and added to contingent fund.

There were other reasons, beside low fares and enlarged capital, for a diminished dividend, which I shall proceed to lay before the reader.

This was "the low-fare year" (1849), referred to in the Annual Report of the Directors, in January, 1856, in support of their arguments, or rather assertions, against the low-fare system.

They say, —

"The system of low fares was effectually tried on the Fitchburg Road from July 1, 1848, to and including December, 1849. The number of passengers transported in 1849, compared with 1848, show that one hundred and twenty-nine thousand five hundred and eighty-five more passengers were carried in 1849 than in the year 1848. But the Company received, for the service and the risk of 1849, $7,130.89 less than it received the year previous (1848); proving a loss, in twelve months' experimenting with these ruinously low rates, of $38,258.93, or more than $57,000 for the eighteen months that this suicidal policy was in force."

Without intending any disrespect, either to the present Board of Directors of the Fitchburg Railroad Company, or to their family connection, the Vermont and Massachusetts Railroad Company, but simply from a natural desire to see charges placed to proper accounts; having, moreover, a disinclination to see the account of "low fares," already overflowing

with improper charges, burdened with still another, — I venture to call the attention of the Directors — managers of both the roads to which I have hereinbefore referred — to a fact that has apparently escaped their observation, or to which they have forgotten to allude. It is, that, out of the loss of $57,000, there should, at least, be deducted a portion of the sum of $28,717.45, "*loss to the Fitchburg Road for one year* (1848), *on the lease*" *of the Vermont and Massachusetts;* thereby materially reducing the loss, charged by them to eighteen months' "experimenting with these ruinously low fares." Moreover, I am abundantly prepared to demonstrate, that, of the 129,585 passengers which it is admitted the low fares brought upon the line, a very large number remain to this day, permanent patrons of the road, not only in their own persons, but in their families, and friends whom they have since induced to join them.

Under the present administration, stockholders may well believe that no loss arising from too low fares can, by any possibility, take place; they may hope that no "loss on Vermont and Massachusetts" will occur, either directly or indirectly. But they may see, hear, and, by their lack of dividends, appreciate, the fact, true as an axiom in mathematics, that there can be no gain in passenger-traffic while the present policy prevails.

Having thus reviewed the statement of the case (as given by the Directors), let us examine *the facts, as they are*, in relation to low-fare year, and see to what conclusion they lead us.

Business of Fitchburg Railroad (own line), 1848, 1849.

	Gross earnings.	Expenses.	Net earnings.	Miles run.	Passeng'rs.	Tons fr'ht.
1848	418,680.11	174,275.17	244,404.94	301,975	655,917	255,404
1849	493,060.43	229,539.92	263,520.51	347,872	875,410	287,032
Inc.	74,380.32	55,264.75	19,115.57	45,897	219,493	31,628

It therefore appears, that, while the miles run, and expenses, both increased in 1849 over 1848, and 219,493 (not 129,585) more passengers were carried in 1849 than in 1848, yet the gross earnings increased over seventy thousand, and the net earnings nearly twenty thousand, dollars. There was consequently no loss of $38,258.93 in twelve months, but a gain of $19,115,57, by "*this suicidal policy.*"

In addition to which, in order still further to expose the ridiculousness of the position assumed by the present Board, I will state, that in the year 1848, for every passenger to or from the Vermont and Massachusetts Road, the Fitchburg Company received one dollar; while in 1849, the lease having expired, they received but eighty cents.

Finally, in order that no suspicion may rest upon the mind of any one, that the present Board are correct in their statements, I will give the reasons assigned by the Directors for the year ending Dec. 31, 1849, why the expenses exceeded those of the preceding year, $55,264.75.

"A large part of the increased expenses of operating the road the last year was caused by running an additional and express train to Fitchburg to accommodate the business of the connecting roads above Fitchburg, without increasing the way business on our

road, as this train does not stop on the Fitchburg Road, excepting for wood and water."

Of 287,032 tons carried in 1849, 105,848 tons, or over thirty-six per cent, were "ice and bricks" from their own line.

Sixteen passenger-trains run daily each way. The accommodation was perfect. The public appreciated the facilities afforded, and towns bordering on the line increased rapidly in population. A great number of new houses were erected; and many families brought to the Fitchburg line in 1849 have ever since been patrons of the road.

The fares were restored to their old point on the first of January, 1850, and with great propriety; for the through business did not equal the expectations of the Directors. Where they expected a large and profitable trade, they had a small and losing one; and the large expenditure which they made to secure it, had so swollen the capital, that nothing but the increased and profitable local business enabled them to pay a dividend of eight per cent.

In speaking of the business of 1850, the Directors remark, that "the increased receipts on freight are not in proportion to the increased tonnage; owing, in part, to the competition on the upper roads, and in part to too low prices."

The Board for 1850, within the knowledge of the writer, fought manfully for higher prices, and made themselves peculiarly unpopular with the officers of connecting roads; but, as the present Board remarked in 1855, "this raising of rates is a difficult

matter to do, unless all the principal roads unite in it." The Board for 1850 found it so, but labored earnestly to secure more remunerating rates. A large amount of money was lost in doing through business; but, as usual, the local trade paid sufficiently to enable the Company to declare dividends of eight per cent.

One-third of the tonnage in 1850 was from ice and bricks.

The dividends paid in 1851 fell off to seven per cent. Over $50,000 were charged to expenses for "new works, new cars, new turnouts, &c."

More than one-quarter of the gross income was on freight from connecting roads.

Increase in 1851 *over* 1850.

Passengers	12 per cent.
Tonnage	10 „ „
Earnings	4 „ „

The Directors say, in relation to the comparatively small increase of earnings, —

"This is owing to the very low prices at which the long freight, so called, is taken, a large part of it hardly paying the actual cost of transportation. This evil can only be remedied by an agreement, carried out in good faith, between competing roads, to require paying prices. Persevering attempts have been made to bring about this desirable result, but so far without success."

Every man conversant with Boston railways will admit that the through tonnage from 1848 to 1853 was carried by all the roads at a loss. It is to wear and tear caused by this tonnage, for which no adequate compensation was received, that the heavy renewals

required the past two or three years is mainly attributable.

In 1852, thirty-eight per cent of the tonnage was for bricks and ice.

Through freight increased materially this year, compelling the Directors to contract for new freight-depots, engine-houses, &c., to accommodate it. Being satisfied that the rate received for a large proportion of this business "was less than the cost of transportation," the Directors raised the minimum rates about fifty per cent. Dividends, six per cent in eleven months.

In 1853, the addition to construction was $93,796.50, principally for improvements at Charlestown.

Over $50,000 were charged to expenses for new machinery and iron. Dividends, six per cent.

With the close of the year 1853 ended the wise administration of Jacob Forster and his able associates.

From the completion of the road in 1845, to and including January, 1854, it had not only paid regular semi-annual dividends to its stockholders, but had vastly increased the business on its line, and proved to be of great benefit to the community. With the retirement of this administration in 1854, the popularity and usefulness of the road, to a great extent, ceased. As a natural and inevitable consequence, its prosperity has, in a great measure, forsaken it, only to be recovered by a total and entire change in its policy.

I have thus given a sketch of the progress of the

Fitchburg Railroad Company, from its origin, in 1842, to January, 1854. The particulars of its history have been given with more minuteness than those of other railways, because I wished to exhibit the contrast between the progress of a railway under a liberal administration, and one entirely the reverse.

Under the broad banner of reform; loudly descanting upon the follies, the faults, and the sins of their predecessors; thrusting to the right and left at all who differed with them in opinion; claiming to possess all the intelligence and honesty in the railroad world; treating the public as a many-headed monster, whose sole delight, desire, and aim it was to ruin shareholders; advertising themselves as martyrs to the cause of railway reform; making loud professions of their own honesty at the expense of that of other railway managers; thanking God they were not as other men, — the Board for 1854 inducted themselves into office.

They declared, in their first Report, a certain class of railway business to be "akin to self-righteousness, — the more you have of it, the worse it will be for you." If this be true, — not of the business, but of self-righteousness, — and I doubt it not, in order to know, appreciate, and fully understand what self-righteousness is, I commend to the unenlightened a perusal of "The Annual Report of the Fitchburg Railroad Company, presented Jan. 30, 1855."

The incoming Board, determined to stop the constant increase of construction account, — the head and front of their complaints, — and not aware of the

necessity for enlarged accommodation, were astonished to discover, immediately upon assuming the direction, "the necessity of still further additions to equipment and freight accommodation." These, — as they were not to cover depreciation, but for increased business, — it is apparent, should therefore have gone to construction; or at least, not being an annual charge, should not have been charged to expenses.

The Directors for 1854 charged every thing to expenses, including the sum of $170,577.97, by far the larger portion of which was for new equipment rendered necessary by increased business, and of which not one dollar was proper to be considered as an annual charge. Thinking it inexpedient, after their professions, to charge to construction the cost of completing the equipment of their road, the Directors for 1854 did so at the expense of withholding dividends from their stockholders. Not content with this, they charged to expenses $45,000, for five first-class locomotives leased to the Rutland and Burlington Railroad Company; no doubt a very judicious investment, as they claim thereby to have "secured the business of that road for a term of years." But it is not so clear that the business would not have been equally secured without the expenditure. Neither is it by any means certain that the profit derived from the through freight thus obtained will compare at all favorably with the profit on special trains, even with a large proportion of season passengers.

It will be recollected that the Directors for 1853, in September of that year, raised the minimum rates on freight fifty per cent.

In 1854, the then existing Board, in pursuance of their high-fare policy, advanced the rates.

Let us note the effect: —

Income.

Year.	Freight.	Passengers.	Mails.	Rents.	Total.
1853	$342,710.66	$294,457.76	$5,783.66	$2,499.29	$645,451.37
1854	390,884.39	301,416.15	7,954.36	4,383.73	704,638.63
Increase of 1854 over 1853.	$48,173.73	$6,958.39	$2,170.70	$1,884.40	$59,187.26

It will be perceived, that, of this *increase*, $81\frac{2}{10}$ per cent is upon freight, the tariffs on which had been altered by their predecessors; for which gain, therefore, the new Board are entitled to no credit.

It will also be noticed, that, of this gain, only $11\frac{6}{10}$ is on the passenger income, the average annual increase of which, for the five preceding years, had been $7\frac{63}{100}$. Yet notwithstanding the advance of fares, and in spite of the fact that many passengers (who have since left) were compelled to remain during the year 1854, the increase of passenger income was but $2\frac{35}{100}$ per cent.

Until 1854, the public were accommodated; the business of the road was constantly increasing; and the dividends, cut down, as the Directors for those years admit, by transporting through freight at less than cost, would have speedily attained their former rate under the judicious advance of through-freight tariffs, too long unremunerative, which took place in September, 1852.

In 1854, as has been shown, the principal gain in income was upon freight; but the passenger income fell considerably below its average annual gain, despite the advance in fares. This, it would seem, should have taught the new Board, not only that through-freight tariffs could be materially advanced without reducing the tonnage, but that passenger-fares could not be advanced without a more than corresponding loss of travel.

The lesson was unheeded; and the year 1855 made manifest the want of judgment on the part of the reform Board.

The Directors, in their Report for the year ending Nov. 30, 1855, say, —

> On comparing the business of 1855 with that of 1854, the following is found to result therefrom: —

On freight from connecting roads, the decrease amounts to	$34,826.78
And, on the branches, the decrease is	6,509.57
	$41,336.35
But, on the Fitchburg proper, there is a gain of	23,223.50
Proving a decrease on the freight business of the year, as compared with the business of the year preceding, of	$18,112.85
On passengers from connecting roads, the decrease amounts to	$5,034.91
And, on the branches, it is	1,441.26
	$6,476.17
But, on the Fitchburg proper, the amount gained is	1,611.78
Leaving a net deficit in the passenger business, compared with the year 1854, of	$4,864.39

	1854.	1855.	*Total decrease in* 1855.
Freight earnings . . .	$390,884.39	$372,771.54	$18,112.85
Passenger „ . . .	301,416.15	296,551.76	4,864.39
	$692,300.54	$669,323.30	$22,977.24

This result is attributed to the "serious drought of 1854." Undoubtedly, the decrease in receipts from connecting roads is attributable to the drought; for those receipts are principally based upon agricultural tonnage, on which the lowest tariff rates prevail. But did "the serious drought of 1854" tend to *increase* the despised local tonnage, upon which there was a gain, in receipts, of $23,223.50?

No management, however faulty, no attempt, however persistently made, either through wilfulness or ignorance, can, in a single year, drive away the entire business of a road like the Fitchburg; and although they earned a smaller percentage on the capital than ever before, yet, —

By adding to the net earnings, as given in the Report	$213.837.81
The sum expended for new work on Prison-Point Bridge	7,486.76
Also the amount which the present Board admit was not properly chargeable to expenses of 1855 . .	7,363.40
The total net earnings for 1855 were	$228,687.97

Equivalent to $6\frac{48}{100}$ per cent on the capital.

In estimating the probable position of the Company at the close of the present year, it would likewise be just to make still another deduction from "expenses." It appears, by the Report for 1855, that this account

is charged with the sum of $10,233.08, being balance of interest. The indebtedness of the Company, Nov. 30, 1855, being but $153,700, against $318,292.85, Nov. 30, 1854, it is fair to presume that the balance of interest chargeable to expenses in 1855 will be materially reduced.

The only fear that stockholders need entertain for the future is, that, in seeking income from connecting roads, their Directors will *continue* to overlook the greater and infinitely more profitable business of their own line, both in freight and passengers.

The number of passengers carried in 1855 having fallen off $16\frac{85}{100}$ per cent from those of the preceding year, it is to be hoped that the Board of Directors will not rely with too blind a confidence solely upon the abundant crops of 1855 to bring them back, but adopt efficient measures in another, and to most people apparently more certain, direction; namely, by rendering it convenient, or at least *possible*, for business men to reside on their line of road.

For the past year, they have diligently, yet doubtless unwittingly, striven, not only to encourage the comparatively unprofitable traffic from connecting roads, to which an undue value is attached, but to drive off, kill, and utterly annihilate, the more remunerative passenger and freight traffic of their own line, — a traffic which I shall attempt hereafter to prove is by far the most reliable source whence Boston roads are to receive their net income.

The results effected by the administrative reform party are partially set forth in the following tables: —

Under the Old Administration.

Year.	Construction.	Debt.	Dividends paid.	Net earnings.	Market price in January.
1852	$3,633,673.57	$110,000.00	$212,400	$232,787.32	103
1853	3,716,870.10	191,500.00	212,400	214,633.66	102

Under the Reform Administration.

Year.	Construction.	Debt.	Dividends paid.	Net earnings.	Market price in January.
1854	$3,730,965.47	$318,292.85	$106,200	$272,715.80	94
1855	3,765,998.19	153,700.00	Nothing.	213,837.81	79

The present market price is 70.

THE OLD COLONY AND FALL RIVER RAILROAD, — UNITED IN 1854.

The last Annual Report of this Corporation, it must be confessed, is both instructive and entertaining. It is a model railroad report; giving no great variety of statistics interesting to the seeker after truth, but bearing on every page proof that its managers are thoroughly awake to their responsibility, and an earnest that the interests of its stockholders are in the hands of men who are watching over them.

The capital stock of the Company is	$3,015,100.00
The gross receipts for 1855 were	653,499.32
Expenses	377,133.62
Net earnings	$276,365.70

Or more than nine per cent on the whole capital.

But there are several items in expenses, that are not a fair annual charge; viz., —

The debt having been diminished the past year $22,184.65, of course diminishes the annual charge to interest	$1,331,07
New station-buildings	6,272.83
Land and land-damages	632.29
South-Boston Flats	803.50
Add to these items the reported net earnings	276,365.70
Real net earnings	$285,405.39

Equivalent to $9\frac{46}{100}$ per cent on capital.

"Some of the improvements are as follows; viz., work-shop at South Boston; station-building at Quincy; woodsheds, at Bridgewater and Middleborough, for housing 1,600 cords of wood; alterations of track at Fall River; and a large kyanizing vat at Braintree.

"The general condition of the road is good, the repairs and expenditures upon it having been more than sufficient to make good the usual deterioration of the year.

"The rolling stock of the Company is now generally in excellent condition." (Annual Report.)

Debt of the Company.

Bonds	$198,200.00
Bills payable	94,450.00
	$292,650.00

Assets.

Stock on hand	$99,032.05
Real estate not needed for use of road (said by the Directors, who are apparently remarkably low appraisers, to be safely worth)	224,457.06
Bills receivable	96,007.89
Sinking fund in Old Colony and Fall River stock	12,270.00
	$431,767.00
From which deduct debts	292,650.00
Excess over indebtedness	$139.117.00

I see, by looking over the Report, that this excess could be made much larger; but, imbued with the

spirit of the Directors, my estimate "is intended to be a *safe* one."

It seems, on the whole, after an examination of the expenses and indebtedness of this Corporation, that their income and property are sufficient to warrant the hope that they will not at present be compelled to take the benefit of the "Act for the Relief of Insolvent Debtors."

Those who can discern no value in any railway property, are invited to inspect the Report of the Old Colony and Fall River Railroad Corporation for the past year.

Let it be borne in mind, that the large railway stockholders, alarmed by the constant annual increase of capital, the true causes of which will be hereafter explained, had resolved to insist upon closing the Construction Accounts of their several corporations; and, as enlarged business required increased accommodations, on most of the lines freight and passenger depots, wharves, bridges, and all other *permanent improvements*, were charged to expenses; while renewals of track and equipment, repairs of buildings, and many other charges, which should really have extended through *each year of the railway's existence*, were crowded into the expenses of one or two years.

Therefore, in estimating the value of railroad property, a just proportion of these charges should be placed to their proper account *in the mind of the inquirer;* for it is not claimed that all of these expenditures are to be annual, as the manner of making up

accounts pursued by most corporations would lead one to suppose.

If Expense Account for the year 1855 had borne only those charges which of right belonged to it, the net earnings of the Boston railways would have materially exceeded those presented in the following table: —

Net income per cent of seven roads terminating in Boston, as shown by their Reports to the Legislature for the year ending Nov. 30, 1855.

Boston and Lowell	$6\frac{76}{100}$
Boston and Maine	$7\frac{94}{100}$
Boston and Providence	$5\frac{37}{100}$
Boston and Worcester	$8\frac{69}{100}$
Eastern (in eleven months) equal in one year to	$5\frac{24}{100}$
Fitchburg	$6\frac{4}{100}$
Old Colony and Fall River	$8\frac{37}{100}$

Being an average on the aggregate capital, of $6\frac{995}{1000}$

Having thus reviewed the several railways, I shall attempt to establish the charge of extravagance, by giving the result of some investigations in the use of fuel and oil.

FUEL AND OIL.

Price per cord of wood on Boston and Worcester in 1855	$6.01
" " " " on New York and Erie in December, 1855	3.53
	Cents.
Cost of fuel per mile run in 1855 on Worcester	$27\frac{97}{100}$
Average cost of fuel per mile by 215 locomotives in Dec., on Erie $14\frac{74}{100}$	
Add 71 per cent, for difference in price $10\frac{46}{100}$	
	$25\frac{20}{100}$

Difference in favor of Erie	$2\frac{77}{100}$
Saving to have been effected, being on 541,528 miles run by Worcester at $2\frac{77}{100}$ cents.	$14,000.32
But on engine No. 56 of the Delaware division of the Erie Road, with a maximum grade of 60 feet to a mile, Samuel H. Wood ran 2,704 miles in the month of December, at an expense for fuel per mile of . . .	Cents. $6\frac{64}{100}$
Add 71 per cent for difference in price	$4\frac{71}{100}$
	$11\frac{35}{100}$
Difference in favor of Erie	$16\frac{62}{100}$
Saving to have been effected, being on 541,528 miles run by Worcester at $16\frac{62}{100}$	$90,001.95
Cost of oil, tallow, and waste, per mile, run on Worcester in 1855	Cents. $2\frac{9}{100}$
Average cost of do. on Erie, in December	$1\frac{28}{100}$
Difference in favor of Erie	$\frac{81}{100}$
Saving on Worcester to have been effected, 541,528 miles, at $\frac{81}{100}$	$4,386.37
But the oil, tallow, and waste used by Samuel H. Wood, on engine No. 56 of the Erie Road, in the month of December, cost, per mile run, but	$\frac{56}{100}$
Difference in favor of Erie	$1\frac{53}{100}$
Saving to have been effected by similar economy on the Worcester	$8,285.38
The average of miles run, to a pint of oil, on the Erie Road, in December, was	$13\frac{63}{100}$
But Samuel H. Wood ran, at an average to a pint of oil or nearly four times the average number.	52

Provided this saving, which has been proved to be possible, were effected, the diminution of expenses on

* This does not, of course, include the cost of oil used in machine-shops, and for other than train-purposes; while the same item of expenditure on the Worcester probably covers the entire amount used by the Company. After making this deduction, the force of the contrast would not be very materially impaired.

the Worcester Railroad, in the year 1855, would have been, on —

Oil	$8,285.38
Fuel	90,001.95
	$98,287.33

equivalent to a dividend on the whole capital, $4,500,000, of $2\frac{184}{1000}$ per cent.

Although, in practice, it would probably be found impossible to effect the whole of this saving on the Worcester, yet no one can doubt that half the amount can be saved; in which case, it will amount to a dividend of $1\frac{92}{100}$ per cent, from the economical use of only two articles. The Worcester Railroad is one of the best managed and most successful roads in the State; and, if these be the facts in relation to that Company, is it not a fair inference, that similar extravagance may be found on other roads, not only in these, but in other, articles?

IRON.

In the infancy of Massachusetts railways, with a view to lessen the prime cost of works necessarily expensive at best, and rendered still more so in consequence of a lack of practical knowledge in relation to undertakings so novel, sufficient attention was not paid either to curves or grades; and, as the capacity of an engine on a level is at least three times

greater than on a grade of fifty feet to the mile, it followed, that, in order to transact the enlarged business over high grades, it became necessary either to increase the weight and power of engines, or their number. The former course was adopted; and the effect produced upon the track by locomotives of immense weight, running at high speed over heavy grades, sufficiently demonstrates that true economy would have avoided curves and grades as far as practicable, even at the expense of increased cost.

The weight and quality of rail were not sufficiently regarded; and vast losses have been incurred from this cause.

Experience proves that the durability of rails depends vastly more upon their *quality* than their weight.

The last Report of the Boston and Worcester Railway expresses the belief, that from "seven to eight years is a safe estimate for the average durability of a rail."

There are rails in some of our New-England roads, weighing not more than fifty pounds to the yard, that have been in daily use for more than twenty years, and will apparently last as much longer. There can be no question that the best quality of iron rails, of sixty-five pounds to the yard, would last twenty-five years, with a larger tonnage passing over them annually than any road in New England can furnish.

But there have been rails laid on our New-England roads that broke with the passage of the first train. Whole cargoes have been laid, and taken up useless within one year.

There are rails, weighing forty-five pounds to the yard, laid seventeen years ago, in the track of the Philadelphia and Reading Railroad, over which has passed an annual tonnage enormously exceeding that of any other road in the world.

The last Annual Report of that Company, in speaking of the unusual expenditure for renewal fund, which has been heretofore provided for by a charge of three cents per hundred tons per mile, says, —

"This sum exceeds the accustomed charge (which, under ordidary circumstances, is believed to be sufficient for that purpose) $95,576.52. This increased expenditure has been chiefly caused by relaying forty and a half miles of track, which, of course, is far beyond the usual average. The second track of the road, to replace part of which this outlay has been incurred, was laid in 1844, and was originally, as frequently stated in previous reports, of an inferior quality of iron. Since that date, more than 14,000,000 tons of coal have passed over this track; and, though the weight of the rails had but very slightly diminished, the surface had become rough and uneven. As ten thousand wheels, in the season of active business, daily roll upon it, it was deemed true economy to relay a large portion of this track in such manner, and of such material, as should secure the machinery from unnecessary wear, and make the roadway itself as perfect and as permanent as possible. The experience of this Company, as communicated in previous reports and confirmed by each year's traffic, is, that upon the quality of the iron, rather than its weight, the durability will depend. Thus the rails first used, weighing forty-five pounds to the yard, and made of carefully prepared reheated and refined iron, have been found far more permanent and serviceable than those weighing one-third more, but manufactured from iron of inferior or different qualities. The new rails, of a weight of sixty-eight pounds, are manufactured of the best reheated iron throughout; and the additional sum expended to secure this description and quality of material nearly equals the whole excess of expenditure on account of renewal fund."

To show the superiority of these forty-five pound rails over others in the same track, and, at the same time, to prove the superior economy of purchasing the best quality of iron, I extract, from the same Report, the following table: —

Comparative wear and breakage of rails on the Philadelphia and Reading Railroad, from 1850 *to* 1855, *inclusive.*

Description of Iron.		Percentage of wear.						Proportion of breakage in 1855.
		1850.	1851.	1852.	1853.	1854.	1855.	
English 52 lbs.	light track.	1.3	2.6	3.2	4.5	7.8	19.8	1 bar in 392
„ 45 „	light track.	1.4	1.9	2.1	3.6	5.6	14.6	1 „ 2.997
„ 60 „	heavy track.	8.3	9.4	12.	12.7	18.8	47.	1 „ 93
Phœnix 60 „	heavy track.	4.8	6.3	5.9	6.3	5.9	14.3	1 „ 343
Montour 60 „	heavy track.		1.7	6.1	8.2	5.9	18.1	1 „ 94
„ 64 & 68 „	heavy track.						2.1	1 „ 260 (Chiefly 64 lbs.)

Upon examination of this table, it will be observed that the breakage on the light track, of rails forty-five pounds to the yard, *laid seventeen years ago, is only* 1 *in* 2997; *while the breakage on the same track, of rails fifty-two pounds to the yard, is* 1 *in* 392. This demonstrates the superiority of the iron in the forty-five pounds rail.

In the last Annual Report of the Fitchburg Railroad Company, page 22, it is stated that a portion of their track, within five miles of Boston, has been relaid twice within three years. The Directors of that Corporation need not go off their own road to satisfy themselves of the extravagance their own declaration admits they have been guilty of; for there are rails on the very five miles referred to, laid in 1842, over which the entire tonnage of the road has passed,

which are in vastly better condition now than other rails, on the same road, laid within a year.

Hence the inference is irresistible, that true economy dictates the purchase of the very best iron, particularly as the increased cost per ton is counterbalanced by the diminished weight of track per mile. Thus, $100,000 expended in the purchase of the best quality of rail, weighing fifty pounds to the yard, at $70 per ton, would lay as many miles of track as the same sum of money expended in a poorer quality of rail weighing seventy pounds to the yard, and costing but $50 per ton. While the cost would be less per mile for laying the light than the heavy rail, *the durability of the former would exceed that of the latter from two hundred to two thousand per cent.*

Or, to put the proposition in another form, if rails of the best quality, at $70 per ton, are employed, instead of low-priced iron, at $50 per ton, the superior quality of the former will permit the use of a very much lighter rail; and the number of miles laid per thousand tons would be, —

With 45-pound rail	$25\frac{45}{100}$
„ 70 „ „	$18\frac{18}{100}$

The loss incurred by the employment of bad iron in our railway tracks has not been confined to renewal of tracks alone; but as it is almost impossible, with any amount of expense, to keep the permanent way in condition where bad rails are employed, the loss has extended to the increased cost of maintaining the rolling stock, consequent upon the rough and uneven surface of the rails.

In addition, the cost of laying rails is about $300 per mile; and it requires no mathematician to demonstrate that the expense had better be incurred once, than two, or possibly even three, times in a period of twenty years.

There is a railroad leading from Boston, the history of whose rails will amply demonstrate the difference between good and bad iron.

In its track may now be found rails, of a lot laid in 1834, the greater portion of which are in excellent condition now, although they have been in constant use for twenty-four years.

In the same track may be found rails, of a lot laid in 1843, of which about one-half have been renewed.

In the parallel track of the same road are rails, of a lot laid in 1849, of which the greater portion have been renewed.

In the same track were rails, of a lot laid in NOVEMBER, 1855, *but taken up in* FEBRUARY, 1856, *utterly useless!*

There have been rails over which forty-one million tons have passed before renewal.

I therefore maintain, that, in estimating the cost of transportation, the charge to running expenses of renewing iron on our New-England roads is a fallacy; because it can be demonstrated that the charge is, for the most part, based upon a quality of iron that should never have been permitted a place in the track of economically managed roads. In fact, it is perfectly clear, that, unless our railroads had possessed

in a remarkable degree the elements of prosperity, they would never have been enabled to bear the vast expense of renewals which the employment of cheap and bad iron has rendered necessary.

SLEEPERS.

Another heavy item of expense on railways is for sleepers.

The average durability of a chestnut sleeper is from seven to eight years; the cost per mile is about $800; the cost of laying sleepers and rails is about $400 per mile.

By the process of kyanizing, the cost is increased about twenty-five per cent; while the durability is prolonged at least one hundred, and probably two hundred, per cent.

It follows, then, that the cost of laying rail and sleepers, including cost of sleepers, being $1,200 per mile, if this expense be incurred twice in a period of sixteen years, —

It will cost per mile		$2,400
While, with kyanized sleepers, the cost in the same period would be, for sleepers	$800	
„ kyanizing	200	
„ laying rails and sleepers .	400	
		$1,400
Difference per mile in sixteen years (exclusive of interest)		$1,000

Nor is this all the saving to be effected; for defective sleepers *very materially* increase the cost of "track repairs."

BRIDGES.

The repair of wooden bridges is also a very heavy item of expense to be taken into account in viewing the subject of railway economy.

Wherever practicable, there can be no doubt that true economy would dictate the construction either of stone or iron bridges, which, although at first more expensive, would yet stand for ages with but trifling outlay; while the repair of wooden bridges would be a large and constantly increasing item of expenditure.

In cases where the law compels the use of pile-bridging over tide-water, every stick of timber above high-water mark should be kyanized; a process that, in a term of years, very materially contributes to reduce the expenditure for repairs.

I have thus endeavored to show that sufficient regard has not been paid to the *permanence* of railway works.

Whatever time may effect in relation to the kind of motive power employed on railways, there can be but little doubt that no material change will be made

in the roadway. Therefore, as renewals to cover depreciation of bridges, sleepers, rails, and buildings, are among the chief items of expense upon a railroad, it is incumbent upon the managers of this description of property to use only the best materials. It is a false idea of economy that induces the employment of cheap iron and perishable sleepers, or the erection of frail and short-lived wooden bridges and buildings.

Having pointed out some of the extravagances of which railway managers have been guilty, many of them the natural consequence of inexperience, but which have none the less contributed to swell the cost of their roads, I shall refer to another great error of which they are reaping the evil effects.

I allude to the expenditures incurred in order to secure a portion of the business of the distant interior.

Stimulated by the early success of roads terminating in Boston, enterprising and public-spirited men projected long lines of railway, reaching towards the great lakes, with a view to secure a proportion of the traffic of the West.

Believing that the opening of these iron rivers would pour an endless tide of business into Boston, double-tracks, extensive depot accommodations, and increased equipment, were deemed necessary in order to accommodate the accession of trade which it was

supposed only awaited the completion of connecting roads to overwhelm them with its wealth.*

The spirit of speculation induced the building of numerous branches to the great trunk roads, in order to secure traffic, the greater portion of which would have naturally found its way to their lines without incurring the expense of these feeders.

The various lines competed with each other for business from the same districts; and in many instances, not content with an equal division of the trade acquired at the cost of expensive branches, entered upon a ruinous competition to secure a business, which, when attained, they transacted at a heavy loss.

Hence the increase of capital invested in the seven roads terminating in Boston.

Have these roads received from connecting lines any return at all commensurate with the expense incurred to secure it?

Clearly they have not.

SHORT TRAVEL.

Most Boston railway corporations would have been bankrupt, had they not been saved therefrom by the very element they propose to neglect, — namely, the local trade.

* The Annual Report for 1849, of a leading road, closed with these words: "The contest between the main lines running into Boston, a few years hence, will be, not which shall do, but which shall get rid of doing, large portions of the business that will be offered."

It will be found, upon examination, that there is not a road in New England whose local does not very largely exceed its through traffic.

In proof of this assertion, I annex —

Table, showing the proportion of local traffic, and that from connecting roads, on seven Boston railways, in 1855.

	Receipts on own road.	Receipts from other roads.	Percentage, own road.	Percentage, other roads.
Boston & Lowell . .	$314,077.91	$165,983.09	65	35
Boston & Maine . . .	548,062.46	276,080.64	66	34
Boston & Providence	446,252.95	96,004.40	82	18
Boston & Worcester .	529,024.37	445,142.81	54	46
Eastern	481,659.47	88,695.92	84	16
Fitchburg	430,658.45	238,664.85	64	36
Old Col. & Fall River	539,482.10	96,674.54	84	16
Total	$3,289217.71	$1,407,246.25	71	29

In the above table, passenger and freight earnings are alone included.

The table on page 28, showing the travel on the Eastern Railroad, between Boston and Lynn, Salem and Newburyport, also proves how entirely beyond expectation the short travel increased, and made manifest its superiority; at the same time, it shows how far the long and through travel fell short of the anticipations of the projectors of that railway.

The following tables, from the Report of the Investigating Committee of the Boston and Maine Railroad, Sept. 20, 1855, tend still further to show the superior importance of local traffic: —

Comparative Statement of Passenger Traffic on the Boston and Maine Railroad proper, and from connecting roads, for three years, ending Nov. 30, 1854.

	1852.					1853.					1854.				
	Passengers.	Miles.	Receipts.	Rate per mile.	Miles each pass.	Passengers.	Miles.	Receipts.	Rate per mile.	Miles each pass.	Passengers.	Miles.	Receipts.	Rate per mile.	Miles each pass.
				cts.					cts.					cts.	
From connecting roads	291,256	9,898,466	$137,379	1.39	34.	427,785	10,777,061	$170,131	1.58	25.19	471,046	11,152,620	$196,799	1.26	25.8
Boston and Maine Road	1,174,668	14,143,665	285,585	2.02	12.04	1,392,967	16,649,624	322,468	1.94	11.95	1,498,418	17,321,259	360,093	2.08	11.56
B. & M. and con. roads	1,465,924	24,042,131	$422,964	1.76	16.4	1,820,752	27,426,685	$492,599	1.79	15.06	1,969,464	28,473,879	$556,892	1.95	14.46

Comparative Statement of the Freight Tonnage of the Boston and Maine Railroad, for the years ending June 1, 1854, and June 1, 1855, on which charges were made.

1854.	Tons.	Tons one mile.	Am'nt received.	Av'ge price per Ton, including depot charges.	Price per Ton per mile, including depot charges.
Amount hauled for connecting roads	111,339	2,912,263	$77,452 51	$0 69.5	2.65 cts.
„ „ for Boston and Maine	138,645	5,770,639	200,969 40	1 45	3.48 „
Amount hauled for Boston and Maine and connecting roads .	249,984	8,682,902	278,421 91	1 11.3	3.21 „
1855.					
Amount hauled for connecting roads	90,867	2,443,977	71,991 64	0 79.2	2.94 „
„ „ for Boston and Maine	151,294	6,336,068	209,489 92	1 38.4	3.30 „
Amount hauled for Boston and Maine and connecting roads .	242,161	8,780,045	$281,481 56	1 16.2	3.20 „

These tables prove that the local trade of the Boston and Maine largely exceeds the through, not only in quantity, but in price. The facts are substantially the same on all other Boston railways.

It will be seen, that, while the local travel largely preponderated, it yet paid more per mile *gross* than the average of the whole; while, from the larger number of passengers transported, the net profit per passenger per mile, on the local travel, exceeded in a still greater ratio that received from connecting roads.

It has already been shown, on page 9, that the proportion per cent of population in the State, within twenty miles of Boston, is $42\frac{95}{100}$, and, within ten miles, is $34\frac{48}{100}$ of the whole; also that the population within those limits is rapidly becoming more dense, and increasing in a greater ratio, than the rest of the State. I shall hereafter endeavor to show that it is from the inhabitants within these limits that the passenger-income of Boston railways is principally derived.

Corroborative of this statement is the fact that the average length of travel on the Eastern, and Boston and Worcester Roads, is only a trifle over sixteen miles; while, on the other five roads, it is but a fraction over fourteen miles each.

The net receipts on the first sixteen miles of a certain railroad out of Boston more than suffice to pay the expenses of the whole line.

It has been stated, by one competent to judge correctly, that the net income on the first twelve miles of railroad out of Boston pays the entire expenses of the seven roads terminating in that city.

Estimate of average daily travel on the Fitchburg Railroad, between Boston and Waltham, and Boston and Fitchburg, in 1855.

	Distance from Boston.	Number of trains both ways.	Passengers per train.	Aggregate number of passengers.	Miles run by trains.	Fare per mile per passenger. Cents.	Receipts per train-mile.	Gross receipts.	Cost.	Net profit.
Waltham . .	10	16 *	100	1,600	160	2.01 †	$2.01	$321.60	$150 ‡	$171.60
Fitchburg . .	50	6	50	300	300	2½ †	1.25	375.00	300 ‡	75.00
Balance of profit in favor of Waltham travel										$96.60

* Ten special trains; six run with Fitchburg.

† Waltham trains are credited with average receipts on whole line in 1855. Fitchburg trains are credited with full fares.

‡ Six Fitchburg trains charged at $1 per mile. Ten Waltham trains charged at $1.20 per mile; six Waltham trains charged $0.50 per mile, for cost of hauling two cars by engines on Fitchburg trains.

The estimate in the preceding table is doubtless, *in every respect*, far more favorable for the Fitchburg, and less favorable for the Waltham, travel than the facts would warrant. Unavailing efforts were made to obtain the precise figures, in order that the relative value of the travel from the two towns might be shown: but the Board of Directors decided, in formal session, that it was inexpedient to furnish the information; thinking, probably, that it was impolitic to enlighten the public upon such matters.

The conclusion to which one must unavoidably arrive is, that the question as to the relative profit on long and short travel concerns only those four or five people with whom the destinies of the Fitchburg Railroad Company are temporarily entombed.

Table showing statistics of average daily travel on the Eastern Railroad, between Boston and Salem, and Boston and Portsmouth, in 1855.

	Distance from Boston.	Number of trains one way.	Number of trains both ways.	Passengers per train.	Aggregate number of passengers.	Miles run by trains.	Gross receipts per mile.	Aggregate gross receipts.	Cost per mile.	Profit per mile.	Aggregate daily profit.
Salem ...	16	10	20	151	3020	320	$2.56	$819.20	$1.08†	$1.48	$473.60
Portsmouth	56	4*	8*	47	376	448	1.48	663.04	0.80†	0.68	304.64
Balance of profit in favor of Salem travel											$168.96

* No separate trains between Boston and Salem are required; but an additional car is retained for Portsmouth travel.

† All trains to and from Salem are charged $1.20 per mile.

Portsmouth trains beyond Salem are charged $1 per mile.

Twelve trains are charged entirely to Salem travel, at $1.20 per mile.

Of the remaining eight trains, three-quarters, or ninety cents per mile, are charged to Salem travel; and one-quarter, or thirty cents per mile, are charged to Portsmouth travel.

The superior value of the Salem compared with the Portsmouth travel is well shown in the above table. Trains for its accommodation run 128 miles less, and receive $168.96 more, each day.

The fact that the average length of travel on all Boston railways is less than fifteen miles, while the average length of road, including branches, is sixty-four miles; the greater number of trains run on short routes; and the density of population within fifteen miles of Boston, — all prove the superior importance of short travel. It is more profitable than long travel, because of the greater number of passengers it affords.

The deduction to be drawn from these indisputable facts is, that it is mainly upon the local business of their lines that each road must rely for its support.

If, then, this short local traffic is of such consequence to railways, why is it overlooked in pursuit of business from a distance, which is so much smaller in amount, and far less profitable?

FREIGHT-TARIFFS.

Through tariffs on merchandise, in many instances, are not sufficiently high, and may be materially advanced without detriment to any one. An advance of half a cent per ton per mile would enable some of our Boston railways to add one per cent to their dividends.

There are many articles carried to stations in the interior, within one hundred miles of Boston, for one-third of the price paid for transport by "baggage-wagons" twenty years ago. Upon many of these articles tariffs might be materially advanced, without in the slightest degree diminishing the quantity offered for transport, or burdening the consumer by the additional price.

For instance, would the charge of an additional cent per ton per mile in the slightest degree check the consumption of sugar, tea, coffee, molasses, flour, or dry-goods?

Such additional charge upon a distance of one hundred miles from Boston would enhance the market value, at that point, of sugar, tea, and coffee, half a

mill per pound; flour, ten cents per barrel; and heavy cotton goods, less than one-fifth of a mill per yard, — the merest trifle to each consumer, but amounting, in the aggregate, to a large contribution for the railways.

But it is doubtless true, that tariffs on many articles of merchandise are so high as to amount to prohibition, and that a trifling reduction would call into existence an entirely new and profitable class of trade.

It is very evident that freight-tariffs on our New-England railways need a thorough revision.

LOW FARES.

Through fares are lower than local on Boston railways, when they should be precisely the reverse; for, owing to the comparatively small number of passengers carried on long routes, the cost per passenger per mile is very much greater than on the short travel, with its long and crowded trains.

This matter is understood in England, where the charges in express-trains for long travel are much higher than in other trains.

But it has been abundantly demonstrated that even a trifling advance of the passenger-tariffs will materially affect the amount of short local travel.

It is believed by the reform party, that an advance in price, even if coupled with a diminution of trains,

would not materially diminish the number of passengers.

The influence of low fares on revenue is well shown in the effect produced by the reduction of postage rates in Great Britain and in this country.

In Great Britain, with average rates of sixpence during the twenty years' preceding reduction, there was no increase of revenue. The first year after reduction to one penny, revenue declined five millions of dollars; but such has been the increase since, the net revenue from postage is several millions more than it was under the old rates.

In the United States, for several years previous to 1838, the annual increase of revenue was about half per cent. From 1838 to 1845, a period of seven years, revenue increased but one-twentieth of one per cent, or $\frac{1}{140}$ of one per cent per annum.

In 1845, rates were reduced to five and ten cents: revenue increased fourteen per cent per annum for six years. In 1851, rates were reduced to three cents; and although the revenue declined at first, as might naturally have been expected from so great a reduction, yet it is steadily increasing, and in 1854 was fifty per cent greater than in 1844.

These facts in relation to postage are presented as a striking proof that the public are materially influenced, in the use they make of a public convenience, by its cost; and when it is considered that, after the reduction of postage rates, it was necessary to increase the number of letters three to six fold, in order to produce a revenue equal to that derived under the higher

rate, the great number of people who were influenced in the amount of their correspondence by the postage charge will, in a measure, be made apparent.

But there is another element developed by low fares; and that is *constant increase.* Before the reduction of postage, revenue had been for many years almost stationary. Since reduction, the limit of increase has not yet been attained.

That the law of low fares is universal in its application is true beyond the possibility of contradiction. Let us see with what force it applies to railways.

A railway committee, appointed by the British Parliament in 1840, collected statistics from every road in Great Britain, Belgium, and France, and reported that these statistics proved that great masses of passengers were *created* by low fares; that a rise of fare *invariably* diminished the net income, and a reduction of fare invariably increased it.

The effect of high and low fares on railway traffic is exemplified in the returns to the House of Commons by railways, July 10, 1840: —

Dundee and Newtyle Railway.

Fare advanced twenty-five per cent on Third Class.

	No. of Passengers.	Receipts.
Nine months preceding rise	40,378	£1,720. 17s. 3d.
Nine months during high fares	29,387	£1,569. 0s. 4d.
The fare was again reduced; and, in the nine months after reduction	46,972	£2,116. 11s. 7d.
Number of trains the same in each period.		

Garnkirk and Glasgow Railway, eleven miles long.

Fare raised early in 1837.

	Passengers.	Receipts.
1836	145,700	£3,850. 4s. 7d.
1837	119,400	£3,803. 0s. 0d.
Further advance of fare in April, 1839.		
1838	126,810	£4,119. 16s. 3d.
1839	97,746	£3,397. 13s. 0d.

Upon the opening of three railways in England, the following effect was produced on travel by a certain percentage of reduction from the old stage-coach fare: —

	Reduction per cent.	Increase per cent.
Newcastle and Carlisle	66	900
Liverpool and Manchester	50	200
London and Birmingham	Nothing	10

These are by no means the most remarkable instances brought to light, in 1840, of the advantage, not to say necessity, of a moderate passenger-tariff on railways: similar results were shown upon all British, French, and Belgian railways, particularly upon the latter.

But it may be said that these results were produced in the infancy of railways, and will not hold good at the present day.

Let us see if the facts warrant such a conclusion.

On the 8th of January, 1856, Robert Stephenson, M.P., world-renowned as an engineer, delivered an address in London before the Institution of Civil Engineers, of which body he is President, in which he stated that 111,206,707 passengers were conveyed on British railroads in 1854, *each passenger travelling an average of twelve miles.*

Mr. Stephenson said, "As regarded fares, the interests of the companies and of the public were identical. Companies must regulate fares by consideration of the circumstances which produced the largest revenue; and the circumstances which produced the largest revenue were those which induced the greatest number of individuals to travel.

"Nothing was so profitable as passenger-traffic, as it cost less in every way than goods, and an average train would carry two hundred passengers. The cost of running a train was overstated at 1*s.* 3*d.* per mile; and one hundred passengers, at $\frac{5}{8}d.$ per mile, produced 5*s.* $2\frac{1}{2}d.$ But this argument did not imply that in all cases fares should be fixed at a *minimum*. *Minimum* fares were most profitable on short routes; but the public were too much occupied to be tempted by *minimum* fares to undertake long journeys. High rates of speed and increased comforts were then required; and these might be charged for."

On the railways of Great Britain, where there are three or four classes of cars, the percentage proportion of travel in each of the first three classes is as follows: —

	First class.	Sec. class.	Third class.
England	13.3	36.0	50.7
Scotland	11.3	15.9	72.8
Ireland	13.3	39.8	46.8

There is still another feature developed on English roads in relation to the different classes of travel. For the last ten years, the increase has been vastly greater on the second, third, and fourth classes than on the first.

Moreover, and strongly corroborative of the assertion in regard to the class of travel that moves on the long routes, it is worthy of notice, that the average length of first-class travel is nearly seventy per cent longer than of either of the other classes; and the average length of second-class travel is about twenty per cent longer than that of the third and fourth classes.

Beside which, the proportion of passengers to a full car, on each class of travel, is as follows: —

	Percentage of full car.
First class	39
Second class	52
Third class	66

The advantage of *full cars* to a railway company must be apparent to every one, as it costs but little more to transport a car when full than if it were empty. Therefore the cost of transporting second and third class passengers is less per passenger per car than of the first class.

On the Great North of Scotland Line, in 1855, with first-class, third-class, and parliamentary cars, the following proportions of travel and receipts were developed: —

	Per cent of travel.	Per cent of receipts.
First class	12.16	23.82
Third class	65.96	54.06
Parliamentary	21.88	22.12

Of the entire passenger-receipts on the railroads of Great Britain in 1854, but twenty-nine per cent was from first-class passengers.

In order to exhibit the increasing prosperity of British railways, the following facts are presented, which were gathered from returns made to the House of Commons, Aug. 6, 1855.

About nine thousand miles of railway are in operation in Great Britain, upon which have been expended *seventeen hundred millions of dollars.* The dividends paid upon the ordinary share-capital stand as follows in the subjoined years: —

1849 . . . . . 1.88	1852 . . . . . 2.40
1850 . . . . . 1.83	1853 . . . . . 3.05
1851 . . . . . 2.44	1854 . . . . . 3.39

Preferred stock yielded an average of five per cent.

Let it be borne in mind, that the British Government exacts a duty from each company amounting to about three per cent of the expenses; that the cost of many of these roads is as high as half a million of dollars a mile; that some cost a million of dollars, and

one as high as fifteen hundred thousand dollars, for each mile of road.

Let it be remembered, too, that, in Great Britain, a return of three per cent upon capital is considered better remuneration than double that amount in this country; that an increase of dividends, equal in ratio to that of the last six years, would, in 1860, give a return of $5\frac{9}{10}$ per cent on the capital invested.

In regard to depreciation, extravagance, and the probabilities of future increase, in the speech to which allusion has been heretofore made, Mr. Stephenson said, "After a certain period in the history of every railway, deterioration reached an annual average; and, as that annual depreciation became a charge as fixed and certain as the cost of fuel or the salaries of officers, it should be admitted as an annual charge against receipts. There was no instance on record in which the receipts of a railway had not been of continuous growth, even when portions of its traffic had been abstracted by competition on new lines." The address concluded with some words of practical application: "The duty devolved on civil engineers of improving and perfecting this vast system. Every farthing saved on the train mileage of the kingdom was £80,000 a year gained to railway companies. There was, therefore, ample field for economical appliances; and therefore no economical arrangement, however trifling, was to be neglected."

In the beginning of the present year, a competition sprung up between several companies whose railways terminate in London. By the latest advices, it ap-

pears that this warfare still continues, and that they are carrying passengers at very low rates. The corporations engaged in this struggle are the London and North-western, the Midland, and the Great Northern. Fares have been reduced about fifty per cent.

It may be asked, What effect has this reduction produced upon the number of passengers?

In a recent London publication (Feb. 23, 1856), it is stated that "the public appear to be taking full advantage of the low fares and increased facilities accorded to them by the various companies." After condemning the course pursued by the Directors of the several lines, the writer proceeds: "One feature, however, which we alluded to in our last notice of this contest, is evidently developing itself; and that is, the creation of travelling consequent upon these extremely low fares. We have heard, on good authority, that the number of passengers is already at least forty per cent more than it was prior to the competition. Some of these passengers are, of course, diverted from other places between which and London the fares continue at the old rates; but the great bulk of them are persons travelling who never would or could travel without the great inducements now offered."

Again, after speaking of the gratification of the public at the reduced fares, he says, "And there are another class of people also looking on with no great feeling of regret: we mean the smaller companies, over whose lines a new traffic is springing up, at-

tracted to the great high-roads to London by the cheapness of transit therealong."

These facts have been mentioned, not in apology for competition, which is worse than folly, but simply to show that *reduced fares will create travel.*

From the foregoing statistics of British railways, it is evident that it is from the great masses of the people paying minimum prices that they obtain their support; and it is equally true in this country. A railway is emphatically a democratic institution.

Let us note the effect of high and low fares on Boston railways.

Fitchburg Railroad passenger-receipts.

Year.	Receipts.	Increase per cent.	Decrease per cent.
1845 . .	$100,817	. .	. .
1846 . .	128,738	27	. .
1847 . .	165,091	29	. .
*1848 . .	186,727	13	. .
1849 . .	213,067	14	. .
†1850 . .	252,858	18	. .
1851 . .	257,562	$1\frac{8}{10}$	. .
1852 . .	253,370	. .	$1\frac{6}{10}$
1853 . .	281,882	11	. .
‡1854 . .	301,416	6	. .
‡1855 . .	296,552	. .	$1\frac{6}{10}$

* Fares reduced, July, 1848. † Fares advanced, January, 1850.
‡ Fares advanced.

It will be perceived, that in 1848, notwithstanding a reduction of half a cent per mile on all travel, passenger-receipts increased thirteen per cent; and, in 1849, fourteen per cent.

It will also be seen, that with an advance in 1850

of half a cent per mile, although receipts increased in that year eighteen per cent, yet the increase fell, in 1851, to $1\frac{8}{10}$ per cent; while, in 1852, there was a loss of $1\frac{6}{10}$ per cent.

In 1854, with an advance on season-tickets, the increase of receipts was but six per cent; and in 1855, with a still farther advance of fares, there was a loss of $1\frac{6}{10}$ per cent.

Old Colony Railroad.

	No. of passengers.	Increase per cent.	Decrease per cent.	Gross receipts.	Increase per cent.
1846 . .	213,144			$125,711	
1847 . .	389,994	82		171,153	36
1848 . .	552,203	41		227,350	32
1849 . .	773,124	40		275,066	21
* 1850 . .	684,263		11	296,170	7
1851 . .	630,599		8	318,075	7
1852 . .	598,166		5	322,213	$1\frac{3}{10}$
† 1853 . .	721,450	26		374,879	16

* Fares advanced.

† In 1853, prices were reduced on the South Shore Railroad (a connecting line), and travel much increased thereby. There was a revival of the shoe-trade, and consequent increase of business from Quincy, Braintree, Weymouth, and the Bridgewaters; also an increase of about eighty thousand passengers on the Fall River Railroad, *called out by low fares to New York.*

The above table demonstrates conclusively that the advance of fares in 1850 was injudicious. It diminished travel on the line; whereas, under the old tariff, it was rapidly increasing. Its evil effect upon income is likewise apparent.

In 1854, the Old Colony was united with the Fall River Railroad. Let us see the effect produced by still higher fares.

As the union of the Old Colony and Fall River Railroads necessarily produced a change in the method of computing travel, the number of passengers carried one mile are given in the following table: —

Passengers, passenger-receipts, and miles run by passenger-trains, on the Old Colony and Fall River Railroad, 1853 *to* 1855 *inclusive.*

	No. of pass. carried 1 m.	Inc. per cent.	Dec. per cent.	Passenger receipts.	Inc. per cent.	Dec. per cent.	M. run by ps. trains.	Inc. per cent.	Dec. per cent.
1853	18,186,442			$425,846			266,762		
1854	17,949,995		1.3	419,014		1.6	285,095	6.8	
1855	17,013,717		5.2	418,931		$\frac{2}{100}$	289,274	1.4	

Fares were advanced in 1854 and 1855; but travel and income fell off, while the number of miles run increased each year.

It will be difficult to extract any argument in favor of high fares from the above table, which was prepared from the annual returns to the Legislature.

But the high-fare party point with exultation to the increased net earnings of the Old Colony and Fall River Railroad in 1855, and attribute them to high fares.

High fares had nothing to do with the matter; for there was a trifling loss of gross income, and more miles were run than in 1854.

Where, then, shall we look for the cause of increased net earnings?

In the comparatively economical management of the road.

In "the saving of expenses in running the road by one Company, and under one management, and to

a close attention to economy in the various departments." (Annual Report Old Colony and Fall River Railroad Company, 1856.)

Is economy incompatible with low fares?

A moderate reduction in the passenger-tariff of the Old Colony Railroad would be immediately followed by an increased net revenue, provided it were managed with its present economy. That this is true, its own history, as well as that of all other railways, abundantly proves.

Passengers and passenger-receipts on the Eastern Railroad, from Salem and Lynn, 1842 *to* 1855 (*season and package tickets not included*).

Year.	No. of Passengers between Salem & Bost.	Fare.	Gross Passenger Receipts.	No. of Passengers between Lynn & Bost.	Fare.	Gross Passenger Receipts.
		cents.			cents.	
1842	124,301	50	$68,025	72,656	31	$22,926
1843	123,805	„	66,991	79,610	„	23,667
1844	140,298	„	76,641	87,207	„	27,034
*1845	192,488	40	81,704	107,977	25	27,997
1846	213,800	„	85,520	125,847	„	31,561
1847	240,925	„	96,370	139,410	„	34,852
1848	251,554	„	100,621	154,261	„	38,565
1849	254,063	„	101,625	155,371	„	38,842
1850	250,685	„	100,274	157,725	„	39,431
1851	172,342	„	68,936	152,825	„	38,206
1852	182,148	„	72,859	156,953	„	39,238
1853	220,364	„	88,145	179,963	„	44,990
†1854	237,089	40 & 50	96,051	186,596	25 & 35	47,584
1855	159,387	50	79,693	142,740	35	49,959

* Fare reduced, April, 1845. † Fare advanced, June, 1854.

It will be perceived, that, from 1846, there was a steady and continuous gain in passengers and receipts, until 1850–51, when the completion of the South

Reading and Saugus branches seriously diminished the travel from Salem and Lynn over the Eastern Road. But after 1851, notwithstanding the division of traffic by the competing lines, passengers and receipts steadily gained until June, 1854, at which time fares from Salem and Lynn were advanced. The effect of that advance, in 1855, was to diminish travel twenty-eight, and gross receipts nine, per cent.

It is admitted that the increase in 1853 was, in a measure, attributable to the revival of the shoe-trade; but *low fares* were gradually bringing receipts up to the standard of 1844. High fares, in 1855, reduced the income from Salem travel, in that year, below the standard of 1845.

The Boston and Lowell Railroad have had so many competitors for their traffic, in the Boston and Maine, Lowell and Lawrence, Stony Brook, Nashua and Lowell, and Manchester and Lawrence Railways, that tables showing the effect of high and low fares on the travel of that road will not be presented: but its history serves to confirm the universality of the law of low fares; the only years in which its passenger-income exceeded $200,000 being 1847 and 1848, with fares at two and a half and two cents per mile, although charges are now three, and have been four, cents per mile.

The system of fares upon the Boston and Maine Railroad has been comparatively uniform; but it forms no exception to other roads, an advance of price having invariably checked the increase of income.

An advance on commutation-tickets produced a

decline of forty-nine per cent in the amount received from that source in the year ending April 30, 1855. The Committee of Investigation, in their Report, Sept. 29, 1855, page 19, recommend increased commutation, in order to bring back to the road the class of passengers who purchase such tickets, which has "greatly fallen off since the commutation was reduced."

The history of the Boston and Providence Railroad presents the most convincing proof of the wisdom of moderate tariffs as a means of increasing income.

The history of the Boston and Worcester Railroad is a perfect argument, proving the advantage of low fares.

Let me not be understood as advocating an immediate return to the lowest system of fares. The price of labor, fuel, iron, and oil, renders such a step inexpedient; but the recent advance of fares will just so surely be followed by diminished revenue as they invariably have been heretofore in this country and in Europe.

The reduction of travel on Massachusetts railways in 1855, from 1854, amounted to more than one million of passengers.

The principal cause was advanced fares.

It will be apparent, to every person who will examine the subject, that the number of railway-passengers annually transported to and from Boston, from the area of a circle with a radius of twenty miles from that city, is at least ten times greater than the population within that area. In other words, the

whole population within twenty miles of Boston average at least ten trips annually to and from that city.

It is also evident that few people would be induced, even by free tickets, to go from Boston to Springfield, Albany, or Buffalo; and that the number of times each of these persons would take such journeys would be limited.

The reason is obvious, — the great masses of the public have no time to devote to such journeys.

But let fares be even slightly reduced upon distances within thirty miles of Boston, and travel would increase rapidly. The ratio of increase would diminish with the distance from the city, not only because the decreasing density of population affords a smaller number of people to be influenced by low fares, but also because the *time* required for the trip is prolonged, and that obstacle to travel thus increased.

There is still another important element of income to be influenced by moderate local fares.

It is that arising from travel between stations in the interior, now to a great extent diverted from railways by private conveyance.

Many causes conspire to withhold this short travel from a railway. Some of these are, the inconvenience of being confined to fixed hours of departure; of going to and returning from stations; and the comparative uncertainty as to the arrival of trains dependent upon connecting lines. These, combined with high local fares, influence many persons in the country to use their own vehicles, in which, if they travel with

less comfort and rapidity, they are at least independent of the ring of the locomotive bell, and choose their own time for going and returning. One of these obstacles can, in a measure, be removed by reducing the passenger-tariff on short routes.

It is believed that, at the present time, the rates most productive of income would be, on regular tickets, two and three-quarter cents per mile for all distances. The increased short travel called out by a reduction from three cents, within one year, would induce railway-managers to make a still further reduction on short routes; while the increased income, with no sensible diminution of passengers on long routes, would speedily reverse the present system of tariffs, and place local fares at two and a half, and through at three, cents per mile.

The highest charges should exist upon railways at the present time, consistent with the increase of business on the several lines. Growth is an element that should never be lost sight of by railway-managers until their roads are worked to their full capacity.

Railway managers often ascribe the great cost of their roads as a reason why passenger-tariffs cannot be reduced.

As a starting-point, it is assumed that the reason given is a complete fallacy. The present cost of a railway is an element that should never be taken into account in the construction of a tariff, the object of which is to produce the largest net revenue.

If a railway with a single track have nearly all the business it can accommodate, and a reduction of tariff

would create traffic sufficient to render a second track necessary; then the cost of such track, and the probabilities of a return sufficient to warrant the outlay, should of course be calculated. But this condition does not exist on Boston railways.

The present accommodations, so far as freight and passenger depots are concerned, would suffice for the transaction of more than double the freight-business done at present, and a vastly greater amount of passenger-traffic.

All the great items of cost are fixed, whether the railways do their present business or enlarge it fourfold. To transact four times the present business would require an increase of equipments and workmen, but not in a ratio corresponding with the increased traffic.

It is conceded that a large amount of business can be done cheaper *pro rata* than a smaller amount. Then, if it be possible, without materially increased expenditure, to transact a larger business, and, as a consequence, at a reduced *pro rata* cost, it is incumbent upon railway managers to reduce fares, *provided* it can be done without injuring the just and acknowledged claims of shareholders. If, with reduced fares, this latter condition can be complied with, then a *reduction* by railway Directors is the only course that can be pursued at all compatible with a faithful execution of the trust they hold from the Commonwealth.

As experience clearly establishes the fact that both the passenger-travel and gross receipts of a railway may be increased by low fares, it remains to be seen

at what additional cost the increased business may be transacted.

Let us see what profit is now made by Boston railway corporations in the passenger-department.

The receipts per passenger per mile, according to the railway returns to the Legislature for the year ending Nov. 30, 1855, were $2\frac{27}{100}$ cents.

Now, if it be true that the average cost of transporting passengers on Boston roads is but $1\frac{27}{100}$ per mile,* which is above the estimate of many, and as high as that of most railway managers, then the net profit on each passenger was one cent a mile. This will give the following result: —

The passenger *net earnings* were $5\frac{15}{100}$ per cent on the capital stock of the seven Boston railways; they were seventy-nine per cent of the entire net earnings of the seven roads; passengers, "rents," and "interest" were eighty-five per cent of the net earnings; passengers, rents, interest, mails, and miscellaneous receipts, were ninety-one per cent of the net earnings.

These facts are taken from returns made to the Legislature now in session, sworn to by the Directors of the several railways, and there can be no doubt of their correctness. It is, therefore, fair to infer that stockholders are looking in an entirely wrong direction for increased dividends.

As it requires about two millions of dollars to pay eight per cent upon the cost of Boston railways, the only question is, How shall that money be made?

* Cost on Boston and Worcester, 1.21. — *See Annual Report of that Company*, 1856, p. 11.

The policy which, at the end of each fiscal year, will leave that amount of money in the treasuries of the several corporations, is the proper one, whether the money be made upon a greater or less number of passengers.

A stockholder is not satisfied when his president tells him, at the end of the year, that he has made less money than he did the last year, but he has made more per passenger. What does the stockholder care for that? He prefers the aggregate result to the profit per passenger. It is little comfort to him that each passenger paid a profit of one cent and a half per mile, unless there were a sufficient number of passengers carried to give him his dividend. One and a half cents per mile is a better profit than one cent, upon the same number of passengers; but one cent upon two millions of passengers is better than one cent and a half upon one million; and there is, beside, the satisfaction of having extended the facilities of travel to the greater number, and of having thereby faithfully executed the trust to the State.

Experience proves that Boston railways make more money at moderate fares than at high ones.

No Bostonian, who has watched the progress of railway enterprise in Massachusetts for the last twenty years, will refuse to acknowledge, that, in E. Hasket Derby and P. P. F. Degrand, Esqs., the public have always found able, earnest, and consistent champions of the low-fare system. These gentlemen, by their united efforts, have accomplished more for the promotion of cheap travel than all others combined.

Mr. Degrand has recently departed from the scene of his earthly labors, leaving behind him an unsullied name. In the last act of his life, he proved the sincerity of his devotion to the interests of his adopted countrymen by liberal bequests made to various religious, educational, and charitable institutions.

Those persons, who at the present time advocate the necessity of advancing fares, claim with satisfaction, as a proof of the moderation of their demands, that "even Mr. Derby" admits the existence of such necessity.

It has been the fortune of the author to hear one or two speeches recently made by Mr. Derby upon railway matters. Nothing was said by that gentleman which indicated any change in his sentiments as to low fares. On the contrary, although he admitted that advanced prices of labor and materials enhanced the cost of operating railways, yet it is believed that he has never expressed a doubt concerning the soundness of the low-fare policy, which he has so ably, faithfully, and consistently advocated for nearly quarter of a century. Mr. Derby has yet to be made acquainted with the first instance in which experience has not demonstrated the correctness of that policy which he has supported with an ability and perseverance worthy of the success which is certain eventually to crown his efforts.

The public owe to Messrs. Derby and Degrand a debt of gratitude for their labors in behalf of cheap travel; and, within one year, it is believed that railway stockholders will acknowledge their interests and

those of the public to be identical; that moderate fares are most productive of income; that existing fares are too high; and that E. Hasket Derby and P. P. F. Degrand have for twenty years pointed out the only true course to insure the greatest pecuniary success of Massachusetts railways.

SEASON-PASSENGERS.

There are two classes of passengers from whom Boston railways do not obtain the average receipts of $2\frac{27}{100}$ cents per mile.

These are, passengers to or from connecting roads and season-passengers; the former, because the charge by Boston roads to connecting lines is commuted on account of the fact that cars are provided by the latter. In regard to season-passengers, particular hostility has been manifested towards them by some railway managers, when it can be readily demonstrated, that, directly and indirectly, they are the most fruitful source of income that railways possess. This idea is scouted at by many as absurd; but railway engineers and superintendents, and some railway presidents, not only believe but know, and not only know but have proved, that season-passengers of themselves pay a large profit, to say nothing of the collateral advantages derived from them. Some testi-

mony will be adduced to prove that even at one cent per mile, which is below the present average charge on season-passengers, a large profit is made.

All must concede that the addition of a train upon a railway involves an increase only upon certain items of expenditure. The great items of cost are fixed, whether a greater or less number of trains are run. The cost of road, salaries of officers, wages of switchmen, depot-masters, and ticket-clerks, are the same, whether ten trains or twenty are run each day. That this is substantially true, no one can deny.

The items of expenditure increased by an additional train are repairs and depreciation of road, engines, and cars; wages of conductor, engineer, fireman, and brakeman; fuel, oil, and waste.

These items may be safely assumed not to exceed the following sums for a train of three cars running one hundred miles a day, at a speed of twenty miles an hour: —

Repairs of road	$15.00
Repairs of engines	8.00
Repairs of cars	7.00
Interest on equipment	2.67
Wages of train-hands	7.50
Fuel	19.50
Oil and waste	1.75
Depreciation	6.58
Incidentals	2.00
Total for one hundred miles (or seventy cts. per train-mile)	$70.00

This estimate is much larger than that of many engineers; but the allowance is intended to be such

that its fairness cannot be called in question by advocates of the necessity for advancing passenger-tariffs. It can and ought to be reduced by economy to less than fifty-five cents per mile. That it is not too low, is confidently believed, as the author has in his possession estimates from two experienced engineers, one of whom fixes the cost at about fifty-six cents, and the other at less than sixty-five cents, per train-mile.

Robert Stephenson estimates the cost of transporting two hundred passengers by railway in England to be fifteen pence, or about thirty cents, per mile. It certainly should not cost more than twice as much in this country.

A gentleman with a railway experience of many years, an advocate of light engines, and frequent trains running at reduced speed, has prepared the following tables, based upon the existing system of railway economy, in which system he believes great improvement is possible: —

Cost per mile of running a train ten miles from Boston, four round trips, eighty miles daily, with three, and also with four, eight-wheeled cars, weighing eleven and a half net tons. Weight of locomotive, twenty-two tons net. Speed, ten miles in thirty minutes. Stations, six. Wood, seven dollars per cord.

	Per mile, three cars.	Per mile, four cars.
Fuel	21.86 *cts.*	25.86 *cts.*
Renewal-fund, cars, engine, road-stations, &c.	12.60	14.80
Train-hands	8.90	8.90
Track-repairs	10.00	12.00
Locomotive and car repairs	11.50	13.30
Oil and waste	2.25	2.50
	67.11 *cts.*	77.36 *cts.*

Estimates for train running as in preceding table, but with locomotive weighing only fourteen tons net. Speed, ten miles in forty-five minutes.

	Per mile, three cars.	Per mile, four cars.
Fuel	16.36 *cts.*	18.66 *cts.*
Renewal-fund, cars, engines, road-stations, &c.	8.50	10.50
Train-hands	8.90	8.90
Track-repairs	7.00	8.50
Locomotive and car repairs	9.00	10.50
Oil and waste	2.00	2.25
	51.76 *cts.*	59.31 *cts.*

It will be seen that expenses with a light engine are considerably less than with a heavy one; yet there can be no doubt that, for the travel within fifteen or twenty miles of Boston, they would be quite sufficient, while expenses would be much lessened by their employment. On long routes, where high speed is required, heavier engines would be necessary, for which a correspondingly increased charge should be made.

There is no injustice in charging more for conveying a passenger one hundred miles in three hours, than when the journey occupies twice that time. High speed is an increased expense to a railway company, and it is economy to the passenger: the company should charge the increased expense; which the traveller will cheerfully pay, in consideration of the economy of time consequent upon increased speed.

There are very few season-passengers from a distance greater than twenty miles from Boston; in fact, it is believed that nine trains out of ten, run principally for the accommodation of season-passengers, are on routes not exceeding twelve miles from that city. The longest route for season-passengers, over which

any considerable number of trains are run for their convenience, is that between Boston and Salem, the statistical result of which travel has already been presented on page 66.

On the Boston and Worcester Road, by far the larger part of season-travel is from stations on the city-side of Newton Lower Falls, about twelve miles from Boston. This travel does not probably average over nine miles.

The Boston and Maine carry more season-passengers than any other Boston road. That class of travel, in 1854, averaged $8\frac{54}{100}$ miles in length.

On the Fitchburg Road, season-travel is for the most part from and below Waltham, ten miles, and Lexington, eleven miles, from Boston: it probably does not average more than nine miles in length.

The season-travel on the Providence Road is for the most part from, and this side of, Dedham, nine and a half miles from Boston; probably averaging in length about eight miles.

The season-travel on the Old Colony and Fall River Road is probably somewhat longer; South Braintree and the Bridgewaters perchance bringing the average length of travel to ten miles.

On the Boston and Lowell, the weight of season-travel does not extend beyond Woburn, ten miles distant from Boston; and the average length is probably not over eight miles.

It is safe to assume, that season-travel on the seven Boston roads is about nine miles, and that the average distance run by trains to accommodate it is not over twelve miles.

Allow the average number of passengers per train to be one hundred and twenty-five, which is below the actual number, and at a charge of one cent per mile, or nine cents for nine miles, the following result from season-travel is obtained: —

RECEIPTS.

125 passengers, 9 miles each, at 9 cents $11.25

COST OF RUNNING TRAIN.

12 miles, at 70 cents per mile 8.40

Profit on train $2.85

Equivalent to a profit of thirty-three per cent, or two and three-tenth cents per passenger.

Although calculations have been published in which season-travel was charged with the whole expense of a train, and that train reduced to one car, yet no intelligent man will deny that a railway derives great collateral benefits from season-passengers, who attract to the line many full-paying passengers.

Many experienced railway managers believe, that, where a season-ticket is sold to the head of a family, the company annually receive, from his family and friends, an amount at least equal to the price of the season-ticket.

An officer of a Boston railway states, that the visitors of a certain season-passenger contribute to the treasury of the company one thousand dollars a year.

A letter was received a few days since, from a well-known railway manager in another State, from which the following extracts in relation to season-passengers are taken: —

"Season-ticket passengers, it has always seemed to me, were valuable to any road at prices a good deal below what some of the roads are about to establish. The prices paid on the Boston and Maine Railroad for last year, I have been told by the best authority, were remunerative to them. Doubtless they can carry quite as cheaply as any other road out of Boston, as they have a very large local population along their line. Their prices, therefore, cannot be regarded as a criterion for all other roads. Season-ticket passengers, if carried in the through trains, can be transported very cheaply. The expense of adding a car to each through train is small; because nothing is added to many of the heavy items of expenditure on a road by such extra car.

"The items to be increased are fuel, repairs of passenger-car, repairs of road; also oil and waste, interest, and depreciation of car. These items may be summed up approximately as follows: —

Fuel	4	cents per mile run.
Repairs of car	2	" "
Repairs of road	1	" "
Oil and waste	0½	" "
Interest and depreciation	3	" "
Total	10½	" "

An average of 10½ passengers to a car, at one cent per mile, you will observe, will pay the expense of an additional car on a train already running, if my estimate above is correct; and I do not think it is far out of the way, it being rather over than under the cost on roads about Boston.

"My own views of the value of season-ticket passengers are somewhat at variance with what may perhaps be regarded as the general sentiment about Boston now.

"I have always supposed that each season-ticket passenger brought to the road more business in other ways than his own travel. He will necessarily have, in the course of the year, many friends to visit him, who will pay the regular fare to the station. He will consume various articles that must be transported on the road as freight, and thus add to the revenue of the road. He will, generally speaking, be a friend to the line, and, in the long run, induce many transient people to patronize the road who would not otherwise use it.

"Season-ticket passengers are often a nucleus around which an

important town springs up, which becomes valuable to a railroad, as presenting other sources of business distinct from the season-ticket business. Such a town, within ten miles of Boston, will give business to a road in both directions. . . .

"A dense population on a line of road must be valuable to the road, even if the head of every family were a season-ticket passenger; because, for every such head of a family at low fares, there would be five or six other members who would travel often at full fares.

"I don't wish to be understood as advocating the lowest fares that have prevailed, for the present time; because the expenses of railroads have increased very largely during the last few years: but, in my opinion, all the railroads in this country, out of large cities, will always find it good policy to encourage season-ticket travel at moderate rates, or rates considerably below the maximum now contended for."

In the foregoing extract it is stated that the Boston and Maine has a very large local population on its line, and is therefore enabled to transport passengers cheaply. Let it be remembered, that this population has, to a great extent, been placed there by the judicious policy of moderate fares and ample accommodation.

In order to show the relative growth of travel on two lines of road, each the head of a system directly opposite, the following table is presented: —

	Boston and Maine. No. of passengers.	Fitchburg. No. of passengers.
1850	1,221,071	1,080,286
1851	1,449,421	1,261,159
1852	1,465,924	1,214,755
1853	1,820,752	1,269,675
1854	1,969,464	1,262,600
1855	1,869,352	1,049,757
	Gain in six years, 53 per cent.	Loss in six years, 2.8 per cent.

It appears that, in 1851, the Fitchburg carried 40,000 more passengers than the Maine did in 1850; but, in 1855, the Maine carried 820,000 more than the Fitchburg. The Fitchburg, as will be seen by reference to table B, at the end of this pamphlet, is the only Boston road, except the Eastern, whose travel was less in 1855 than in 1850; and there is little reason to doubt that it will not exceed, if it equal, 950,000 passengers in 1856. The cause is apparent: its passenger-business is worse managed than that of any other Boston road. Universal discontent prevails along the line; and many people have been driven thence, because the lack of accommodation rendered it impossible for them to remain.

So heavy a loss of travel is a serious matter for a railway, because a small number of people cannot be transported so cheaply per passenger as a larger number can; and an attempt to reduce the *pro rata* cost on the smaller number, by diminishing the number of trains, only adds to the evil; for nothing so contributes to increase the population and travel on a railroad as the frequency of trains. It is mainly to the fact that a person can find a conveyance to those towns at all hours, that Roxbury, Cambridge, Charlestown, Chelsea, and East Boston, owe their population.

Light engines, running every half-hour or forty-five minutes, at two-thirds the present expense, would speedily develop a great increase of profitable travel within ten miles of Boston.

If, as has been shown, the profit on the passenger-travel of Boston railways, in 1855, was one cent per

mile, it is surely desirable that such profit be made upon two millions rather than upon one million of passengers, particularly as the increased number enables a company to reduce materially the *pro rata* cost of transport.

Then, if it be desirable to increase travel, how shall it be done?

By holding out to the public every inducement to travel; by moderate tariffs and frequent trains; by encouraging season-travel; and by inducing people to build houses on the several lines of railway, to the end that one continuous village may line their margins, and perfect the system already commenced.

In England, this policy is so well understood, that one of the chief lines in the kingdom, the Lancashire and Yorkshire, furnish first-class free-tickets, for terms of from seven to twelve years, to all who will build on their line a house worth an annual rent of £40. A similar policy prevails on all European roads.

There are about 6,500 season-tickets sold by Boston railway companies; and an advance of five dollars per annum on each, which is about the maximum contended for, would add to income but one-tenth of one per cent on the capital invested, *provided every passenger remained, and the companies lost none of the collateral benefits derived from season-travel.*

If the passenger-business on the various lines of railway leading from Boston were managed as it should be, there is no room for doubt that, within five years, that traffic alone would pay eight per cent upon the capital invested.

MASSACHUSETTS RAILROADS.

Since the greater part of the preceding pages was written, a pamphlet, bearing the title "Massachusetts Railroads, 1842 to 1855," has been issued, under the auspices of the Hon. William Appleton, and William H. Swift, Esq., formerly President, and still Director, of the Western Railroad. It is also well understood, that the Hon. William Sturgis is an indorser of the paper; and it must be confessed, that such paper, with such an indorser, is likely to pass current in Massachusetts.

No Bostonian can doubt that the sentiments expressed in their pamphlet are honestly entertained; neither can any one suppose that the persons from whom it emanates are actuated by self-interest merely in its publication. Their public spirit is too well known to justify such a suspicion. Nor can their general intelligence or wisdom be called in question; for, with Bostonians, their character, ability, and standing need no encomiums. But it is submitted, that possibly they are mistaken on the subject of railway management, and are looking in a wrong direction for the remedy of evils of which they complain. Are they not misled by new and false lights in the railway world?

In the preceding pages, nearly every topic discussed in Mr. Swift's pamphlet has been alluded to; but there are some statements, made therein, that demand particular comment.

On page 5 of the pamphlet alluded to, Mr. Appleton, in speaking of the Boston and Lowell Railroad, says, —

"In 1835, the gross receipts on this road were	$64,654
And the expenses of operating the road were	19,125
Net	45,529
Cost of construction and equipment	1,312,239
In 1844, from Receipts	316,909
Expenses	139,293
Net	177,616
Cost of construction and equipment	1,902,555
In 1854, from Receipts	442,497
Expenses	364,478
Net	78,019
Cost of construction and equipment	$2,158,932"

When the above statement was made, the legislative railway returns for 1855 had not been published. They have since been made public, and exhibit a different result.

In 1855, from Receipts	$489,754
Expenses	366,120
Net	123,634
Cost of construction and equipment	$2,188,595

Referring, on page 9, to a table in which is exhibited the net revenue of Massachusetts railroads from 1842 to 1855, Mr. Swift says, —

"Here, again, the net revenue in 1854, with more capital employed than in 1850 by the sum of $8,436,000, was $197,000 less than it was in the last-named year; or the rate of earnings was reduced thirty-eight per cent in the four years."

It is probably true, that depreciation in 1850 was not fully met by renewals; and it is certainly true, that, in 1854, the depreciation *of former years, as well as of* 1854, was met in that year.

But on page 20 of the same pamphlet are to be found figures that entirely destroy the force of the comparison.

It is there reported, that in 1854, although the Fitchburg Railroad Company charged as expenses the sum of $647,919, yet "working expenses" were but $431,922; leaving an amount expended on new buildings, new cars, &c., of $215,997.

It will thus be perceived that Mr. Swift admits that the *real* net earnings of one road, over those reported, not only entirely swept away the deficit of $197,000 alluded to, but increased the net earnings of 1854 to the extent of nearly $19,000.

A similar practice prevailed, to a greater or less extent, on all Boston railways; and, if from their reported expenses for 1854 were deducted the sums which did not of right belong to that year, a result very different from that presented in the pamphlet of Mr. Swift would be made apparent. Yet, in that very year 1854, the net earnings of seven Boston railways, as stated by Mr. Swift, amounted to $6\frac{18}{100}$ per cent on the capital invested.

Again: on page 9, Mr. Swift presents the following table, showing the aggregate of passengers and tons carried one mile in 1850 and 1854; *to which I add that of* 1855.

The aggregate of passengers and tons carried one mile was, —

In 1850	165,890,000
In 1854	219,799,000
In 1855	213,562,664

It will be seen that there was a falling off of more than six millions in 1855. The system of high fares is the explaining cause.

On page 16, in recommending a reduction in the number of trains, Mr Swift says, —

"For example, there are eight trains each way between Boston and Dedham; that is, 160 miles daily. This large number of trains, it is to be supposed, the convenience of the public demands. Let us see the probable cost to the company of doing this particular work.

"The cost of each mile run by trains in 1854, on the Boston and Providence Road, was just $1, as shown in table 2: it may be inferred, therefore, that if four trains were run daily, instead of eight, that $80 per diem might be saved in the cost of the Dedham business. This is not an unreasonable deduction: for the $1 applies to all freight trains as well as to passenger; and these remarks in the Dedham case, being applied to passengers alone, would seem to show that $1 per mile run is not too much to place to cost of that particular work. But I use these figures merely for illustration: there are plenty like them elsewhere."

A stronger argument in favor of low fares, than is implied in the foregoing extract, cannot be desired. It certainly follows, that, in order to accommodate the passengers in four trains who are now carried by eight, each of the four trains must carry double the present number of passengers. If, then, a saving of $80 per day can be effected by reducing the number of trains to four, is not the admission made, that the cost per train of transporting twice the present number

of passengers is no greater than the present cost per train with its smaller number?

This is a more important admission than facts were supposed to warrant. It was believed that the cost of transporting 500 passengers per train was greater than for the transportation of 250.

The truth was thought to be more in accordance with a statement given on page 95 of this pamphlet; although the estimate there given, of the cost of $10\frac{1}{2}$ cents per mile for an additional car to a running train, is rather higher than it is believed to be by many experienced persons. It is therefore very gratifying to know, in regard to Mr. Swift's figures, that "there are plenty like them elsewhere."

But no one can doubt that the number of passengers transported in the four trains would not nearly equal the number now carried; for the frequency of trains is a material element in increasing the number of railway travellers. With a person doing business in Boston, the chief objection to a residence in the country is being confined to fixed hours of departure.

The great obstacle to the interchange of visits between country and city people is the time required therefor.

If persons, living ten miles from Boston, can visit that city, and return within two or three hours, they will certainly go much oftener than when trains are so run as to render it necessary to be from home twice that length of time.

Mr. Swift recommends, on pages 16 and 18, a reduction in the speed of all trains.

Doubtless many trains are run at too great velocity; and, on short routes, the speed of passenger-trains may be reduced to eighteen miles an hour, without decreasing travel.

On routes longer than ten or twelve miles, one advantage arising from greater speed should be considered: it is that the area of territory tributary to a railway increases with the speed of travel.

A reduction to ten miles an hour in the velocity of freight-trains would be productive of great saving to railways, and satisfactory to the public.

On page 19, in speaking of the relative cost of transporting passengers and freight, Mr. Swift says,—

"My own experience, and certain information of a tolerably exact nature which exists upon this subject, has led me to the conclusion, that, in general with us, it does cost just about twice as much to move a ton one mile as it does to move a passenger the same distance. I shall so assume it here."

It appears by table 1, page 19, of Mr. Swift's pamphlet, that the following was the result of the passenger and freight business on thirty-seven Massachusetts railways in 1854, viz.: —

Number of passengers carried one mile	194,158,800
Receipts from passengers	$4,495,800
Number of tons freight carried one mile	104,583,000
Receipts from freight	$3,725,100

These figures show the following facts, viz.: —

In 1854, receipts per passenger per mile	$2\frac{31}{100}$ cents.
" " per ton per mile	$3\frac{56}{100}$ "

On page 14, the cost of transport is stated to be,—

Per passenger per mile	$1\frac{213}{1000}$ cents.
Per ton per mile	$2\frac{426}{1000}$ „

Now, if it cost twice as much per mile to carry a ton as it does to carry a passenger, then the above figures demonstrate with certainty that the passenger-department pays a much larger percentage of profit than the freight. They likewise prove, that, provided as large a percentage of profit were made on freight transportation as settled by Mr. Swift's formula, the receipts on freight per ton per mile should have been $4\frac{58}{100}$ cents, or $1\frac{2}{100}$ cents more than the actual receipts. This additional charge on the tonnage transported would have amounted to the sum of $1,066,746.66, or more than sufficient to have maintained the motive power on the thirty-seven Massachusetts railroads.

On the 9th of June, 1855, in a communication to the "American Railway Times," Mr. Swift states (over his own signature), that on eight of the principal roads in Massachusetts, from 1846 to 1850 inclusive, 490,838,686 passengers, and 268,551,340 tons of freight, were carried one mile, and that the cost of transportation was $10,977,839. He then says,—

"Since that time (1851), the cost of transportation has greatly increased, as will be shown by the following figures of the same roads for the year 1854, viz.:—

Miles run by trains	4,012,313
Passengers carried one mile	156,075,150
Tons freight carried one mile	85,568,977

"Cost of doing the work, $4,353,865; or at the *average* rate of $1\frac{80}{100}$ cents per passenger, or per ton of freight one mile.

"Now, if we assume that it does cost double the sum to carry one ton one mile that it costs to carry one passenger one mile, the results deduced from the previous figures will be these, as applied to the roads named, viz.: —

Cost of transporting one passenger one mile, 1846 to 1850 inclusive	0.963	cents.
Do. do. in 1854	1.20	„
Cost of transporting one ton one mile, including loading and unloading, 1846 to 1850	1.926	„
Do. do. in 1854	2.40	„ "

The figures showing the cost are incorrect in every instance. They should be, —

Cost of transporting one passenger one mile, 1846 to 1850 inclusive	1.06	cents.
Do. do. in 1854	1.33	„
Cost of transporting one ton one mile, including loading and unloading, 1846 to 1850	2.12	„
Do. do. in 1854	2.66	„

On the 26th of June, 1855, in a communication to the "American Railway Times," Mr. Swift states (over his own signature), —

"In the year 1852, the Boston and Worcester Railway transported as follows: —

Passengers one mile	20,236,684
Tons freight one mile	9,051,119
Total of both	29,287,803

"The actual *cost* of this work, as appears by the report to the Legislature, was $414,109.29; hence the average cost of one passenger one mile, and one ton one mile, was 1.42 cents.

"The President of the corporation, in his report to the stockholders for the same year, says, —

"'By a careful analysis of the expense account of this road, charging to freight expense a proportionate part of the expenses which are common to the freight and passenger department, it will be found that the cost of freight transportation, including the cost of loading and unloading, is, on an average, 2.10 cents per ton per mile.'

"Now, as these figures for the year 1852, above quoted, show the average cost of one passenger or one ton one mile to have been 1.42 cents, two will have cost	2.84 cents.
Cost of one ton freight one mile, as declared by the President in his report	2.10 „
Leaves the cost of one passenger one mile	0.74 cents.

"Or the cost, in this case, of transporting one ton, including the cost of loading and unloading, is nearly *three* times the cost of transporting one passenger, instead of twice, as I have stated it to be."

Mr. Swift's solution of the question is entirely wrong. One would suppose that the cost of transporting a ton of freight, also the number of tons transported, and the cost of transporting both tons and passengers, being known, it would not be a very difficult task to ascertain the cost of passenger-transportation. It is probable, however, that the sum was so easy that no thought was bestowed upon it.

The following is supposed to be the correct solution of the problem.

If it cost $2\frac{1}{10}$ cents per mile to carry the ton, then it cost $1\frac{7}{100}$ cents to carry the passenger (not $\frac{74}{100}$ cents); but, if the cost of transporting the ton were twice that of the passenger, then it cost $1\frac{6}{100}$ cents to carry the passenger, and $2\frac{12}{100}$ cents to carry the ton.

It is unfortunate for "Massachusetts," Mr. Swift's

antagonist in the controversy which called forth the communication previously referred to, that he did not discover the fallacy of the calculations.

In "Massachusetts Railroads, 1842 to 1855," pages 13 and 14, Mr. Swift says, —

"In 1854, by table 1, we see that 194,158,000 passengers, and 104,583,000 tons of freight, were carried each one mile; aggregate, say 298,741,000 one mile.

"The average cost of moving one or the other of these one mile was $1\frac{820}{1000}$ cents."

He then assumes that the cost of transporting a ton of freight is twice that of a passenger, and proceeds as follows: —

"Mean or average cost of one in 1854	1.82	cents.
" " " two in 1854	3.64	"
Calling the proportion as one to two, it will be found that one passenger costs	1.213	"
One ton costs	2.426	"

"In other words, it may be said, under this assumption in the relative costs of passengers and tons, that for the year 1854 it cost, in round numbers, about $1\frac{1}{4}$ cents per passenger per mile, and $2\frac{1}{2}$ cents per ton per mile."

Here again we find an error utterly fatal, not only to the correctness of Mr. Swift's *figures*, but also fatal to his theory.

The true answer to the proposition is: —

One passenger costs	$1\frac{34}{100}$ cents.
One ton costs	$2\frac{68}{100}$ "

So much for the figures. Now for the theory.

As Mr. Swift *knows* that it did not cost $1\frac{34}{100}$ cents

to carry passengers one mile on the thirty-seven Massachusetts roads in 1854, his favorite theory of 1 to 2 falls to the ground.

Mr. Swift's figures are incorrect, because he has left out of the account *the difference in the number* of tons and passengers carried one mile. It will be found, if the several costs of transport as given by Mr. Swift are multiplied by the number of tons and passengers transported, that the product will not amount to the sums expended; in other words, Mr. Swift's "*sums do not prove.*" The only condition under which his method of calculation can be correctly applied is when the number of tons and of passengers is precisely the same. Moreover, as applied to Boston railways, this arbitrary theory never was correct, and is becoming less so every day. The relative cost of freight and passenger transportation is effected by numerous contingencies, and varies on all roads.

On the Reading Railroad, with a comparatively light passenger-travel, and an enormous tonnage, moved over a descending grade, the cost per ton is less than the cost per passenger; but on the Boston and Maine, Providence, Eastern, and Old Colony Roads, with a light tonnage and large passenger-traffic, the cost of moving the ton is far greater than that of moving the passenger.

The Fitchburg Railroad, with a large business in both departments, presents as favorable an opportunity for the application of Mr. Swift's theory as any Boston road. Let us make the application upon its business in 1855: —

Comparative statement of business on Fitchburg Railroad proper, and from connecting roads, in 1855.

	Fitchburg.	Connecting roads.	Fitchburg and conn. roads.
Passengers carried 1 mile .	11,225,265	3,506,891	14,732,156
Receipts per pass. per mile	$1\frac{91}{100}$ cts.	$2\frac{34}{100}$ cts.	$2\frac{1}{100}$ cts.
Total passenger-receipts .	$214,236	$82,314	$296,551
Tons freight carried 1 mile	4,220,813	5,936,096	10,156,909
Receipts per ton per mile .	$5\frac{12}{100}$ cts.	$2\frac{63}{100}$ cts.	$3\frac{67}{100}$ cts.
Total freight-receipts . .	$216,421	$156,350	$372,771

The total working expenses of the Fitchburg Railroad, in 1855, were $467,324. Applying Mr. Swift's formula to the above table, it will be found that the cost of carrying was —

Passenger per mile . . . . . $1\frac{33}{100}$ cents.
Ton of freight per mile . . . . . $2\frac{66}{100}$ „

It will be seen, that, on freight from connecting roads, the receipts per ton per mile were but $2\frac{63}{100}$ cents, or $\frac{3}{100}$ cents less than the average cost; while on the Fitchburg proper they were $5\frac{12}{100}$ cents, or nearly twice as much.

The average number of passengers per train-mile was . . . 66
The average number of tons per train-mile was 52

Does any man believe that it cost no more than twice as much to transport fifty-two tons of freight than it did to carry sixty-six passengers, weighing less than six tons?

Estimating the weight of each passenger and his

baggage at two hundred pounds, — which is, of course, far above the average, — the following results are obtained: —

Useful load carried one mile on the Fitchburg Railroad in 1855, *and gross receipts for the same.*

	Tons.	Gross receipts.
Passenger-department	1,473,215	. . $296,551
Freight-department	10,156,909	. . 372,771

The cost of fuel per train-mile is twice greater in the freight than in the passenger department.

The cost of cars in the passenger-department, 28 at $2,000 each, is	$56,000
The cost of cars in the freight-department, 479 * at $700 each, is	335,300

When the expense of handling freight, the great expenditure in real estate, and the amount of capital invested in cars solely for its accommodation, are taken into account, no one can doubt that the cost of carrying a ton of freight on the Fitchburg Railroad in 1855 was at least three times greater than that of the passenger. No man can believe in the correctness of Mr. Swift's theory, as to the relative cost of freight and passenger transportation, who will visit the freight-grounds of the Fitchburg Railroad Company at Charlestown; witness the extent of buildings, the great amount of land covered with iron tracks; observe the number of cars and multitude of men employed in the freight-department; note the length of time required to load and unload a train, and contrast it

* 353 eight-wheeled and 252 four-wheeled cars, equal to 479 eight-wheeled cars.

with the condition of things at the passenger-station in Boston, where a train with two hundred passengers is unloaded and ready within five minutes for further service.

It is believed, that, if Mr. Swift will revise his figures, and take into consideration the relative number of passengers and tons carried one mile, he will abandon his theory, so far as the seven railways terminating in Boston are concerned. Boston railways ought to and can obtain higher rates for freight-transportation generally; but tariffs should be judiciously altered: on many articles they are too high, and on others far too low. The classes of freight should be increased, and sound discretion used in affixing tolls thereon.

It is thought that a careful perusal of the histories of the several Boston railways will demonstrate that passenger-fares are too high and freight-tariffs too low, and also that the receipts from both departments may be much increased. It is not doubted that expenses can be reduced *at least thirty per cent*, by the introduction of a more comprehensive economy and greater system in the management of Massachusetts railroads.

RISK OF PASSENGER-TRANSPORT.

A great deal has been said recently about the risk of transporting passengers, and the necessity of increasing fares, in order to establish an insurance fund,

out of which to pay for damages incurred by passengers.

Calculations have been gravely put forth by one company, showing the value of a car-load of passengers at $5,000 per head; when it is believed, that, upon the very road from whose President the calculation emanated, more than ten millions of passengers have been transported since its completion, without one being killed. On the seven Boston railways, in 1855, 8,111,030 passengers were transported. The only accidents fatal to passengers were on the Boston and Maine Road, in October last. A train, running over a cow, was thrown from the track, and two expressmen were instantly killed.

It is believed that closer attention to fences would more effectually exclude cows from a railway track, than an additional charge on passenger-travel.

On the railways of New York, in 1854, one passenger was killed, by causes beyond his own control, for every 198,636,149 miles travelled; and one passenger was injured for every 66,212,050 miles travelled.

On British railways, in 1854, 93,346,149 passengers were carried, and only nine were killed by causes beyond their own control.

Boston railways pay far more for "lost and damaged freight" than for injuries inflicted upon passengers.

It should be remembered too, by railway managers, that by far the larger part of the items of "taxes and insurance," and also of "labor," are chargeable to freight-department; and that the amount of capital

invested in real-estate, cars, and engines, is far greater in the freight than in the passenger department.

It is in the freight-department that thorough reform is absolutely necessary.

COAL-BURNING LOCOMOTIVES.

The rapid inroads upon the forests of this country, and the consequently increased price of wood, caused by railway demand, render it incumbent upon railway managers to seek some fuel other than wood for locomotives.

Experiments have been made, with varied success, with anthracite, semi-anthracite, and bituminous coals; and recent experiments with coke are said to have been quite successful.

In England, engines are run exclusively with coke, costing from five to six cents per mile run.

On the Boston roads, the cost of fuel, varying from eighteen to twenty-eight cents, averages $24\frac{43}{100}$. It is believed that coke can be delivered in Boston at thirteen dollars per gross ton. If this can be done, and the consumption per mile run does not exceed that on English roads, about thirty pounds per mile (twenty on passenger and thirty-eight pounds on freight engines), it would reduce the cost of fuel to about seventeen cents per mile.

But the probability is that coal will be adopted as the fuel for locomotives in this country, as there is

great waste in the production of coke; and we have such a variety of coals, that there can be little doubt that some of them will be found to possess all the desired properties.

In January, 1855, Mr. G. A. Nichols, Engineer and Superintendent of the Philadelphia and Reading Railroad, sent a communication to the "Pottsville Journal," embodying a statement of his experience in the use of anthracite coal as a fuel for locomotives: —

"Engines using coal cost from ten to twenty per cent more for repairs than those using wood; but one ton of coal is equal to one cord and a half of good dry oak-wood. Coal-burning passenger-engines hauled six eight-wheeled cars ninety-three miles, at a speed of thirty miles an hour, with a consumption of about two and a half tons of coal."

At six dollars per ton for coal, the cost of fuel per mile would be about sixteen cents.

Since that time, great improvements have been made, by which the cost of repairs has been reduced; and, in 1855, 2,213,292 tons of coal were transported on the Reading Railroad exclusively by engines burning anthracite coal.

[From the "American Railway Times," March 22, 1855.]

"*Result of an experiment with the 'Anthracite,' coal-engine, on the New-Bedford and Taunton and Taunton Branch Railroads.*

"Mr. Editor, — The following results of the operation on our road of the coal-burning locomotive 'Anthracite,' for ten days, burning Cumberland coal, will be interesting to every railway superintendent: —

The number of miles run was	1,082
The pounds of coal used were	29,710

showing the consumption of coal to be $27\frac{46}{100}$ lbs. per mile.

"Calculating the cost of fuel, it is found that —

13 tons, 5 cwt., 1 qr., 2 lbs. coal, at $7 per ton, amounted to	$92.84
Add cost of wood for kindling	17.00
Total cost of fuel	$109.84

or a cost per mile run of $10\frac{15}{100}$ cents.

"I have not been able to ascertain accurately the value of the coke and coal taken from the grates each day, but estimate it to be worth at least one-half the cost of the wood for kindling.

"A. E. SWASEY, *Superintendent.*"

The subjoined table presents the result of some experiments recently made with semi-bituminous coal: —

Experiments made on the Washington Branch of the Baltimore and Ohio Railroad, with passenger-trains, to test the practicability of using semi-bituminous or "Cumberland" coal in locomotive engines of the ordinary form.

Date.	Distance.	Time.	Pounds of Coal.	Number of Stops.	No. of Passenger Cars.
1855.	Miles.	Hrs. Min.			
June 23	38	1 30	2200	2	9
June 26	38	1 30	1665	2	9
July 9	38	1 45	1140	9	5

Comparison of results with wood and with coal on Washington Branch of Balt. and Ohio Railroad, in June and July, 1855.

	Description of Fuel.	Dist.	Time.	Wood.	Pounds of Coal.	No. of stops.	No. of Cars.
		Miles.	Hrs. Min.	Cub. ft.			
Average of 8 trips	Pine-wood . . .	38	1 48	150.49		7	$7\frac{1}{4}$
" " 8 "	"Piedmont" coal	38	1 45	12.06	1956	7	$7\frac{1}{2}$
" " 11 "	"Piedmont" coal	38	1 40	12.05	1401	6	$6\frac{1}{4}$
" " 4 "	"American" coal	38	1 48	14.05	1261	7	6
" " 1 "	"Swanton" coal	38	1 45	10.05	1160	8	7

Cumberland coal can be landed in Boston at six dollars per ton. Assuming the price per ton of coal, or per cord of wood, to be six dollars, the result of the foregoing experiments may be thus summed up: —

Engines.	Miles run.	Cubic feet of Wood.	Pounds of Coal.	Cost per mile.	Cost per Trip.
Wood	38	150.49		18½ cts.	$7.05
Coal	38	12.78	1552	12 6/10 „	4.80
Saving on coal-engine				5 9/10 cts.	$2.25

Numerous experiments have been made, in the Northern and Western States, to test the practicability of using coal for locomotive purposes. The result of these proves conclusively that bituminous coal can be advantageously substituted for wood.

Bituminous coal is found to have a less injurious effect than anthracite upon iron. Although, until recently, no result entirely satisfactory has been attained in its use, it is probable, that, in the New-England States, Cumberland coal is better adapted than any other for the purpose desired. The great obstacle to the introduction of coal has been the difficulty of securing a perfect combustion of the smoke and gases. At the temperature of about 700 degrees, the smoke of bituminous coal is entirely consumed; but at a lower degree of heat it attaches itself, in the form of soot or lamp-black, to the shell of the boiler, and to the flues; thus not only lessening the draught, but also acting as a cloak to prevent the direct con-

tact of heat to the water surface, thereby reducing the evaporative power of the fuel. Some mechanical arrangement was therefore desired, by which the evolved gases, in their passage to the chimney, should be measureably detained in sufficiently close proximity to the fire-box, and also so mingled with the outer air as to insure their combustion, not only to save fuel, but also that a perfectly clean heat should come in contact with the flues of the boiler.

This has been attempted by builders with various degrees of success.

Many of the Western railways pass through a country abounding in coal, but comparatively destitute of wood; and it is imperative upon their managers to use coal as their fuel.

The following letter, from a Division Superintendent of the Illinois Central Railroad, gives the result of recent experiments with a coal-burner on that railway: —

"Illinois Central Railroad Co.,
Division Superintendent's Office,
Amboy, July 24, 1856.

"No. 51 completed its twenty-first trip yesterday, and has run 2,310 miles, doing regular freight-train service between Wapella and Amboy. The results are highly gratifying; and it is a fixed fact, that all our wood-burning engines can be converted into coal-burners, at an expense not exceeding $275 each. I have caused the fire-boxes, flue-sheets, and flues to be thoroughly examined every trip, both at Wapella and Amboy, in order to detect any defect or injury which might result; and, up to last night, we have not discovered the slightest. The fire-box, flue-sheets, and flues are as free from scales and expansion as on the day coal was put in the furnace. The flues have not leaked a drop; the engine has not lost a trip, nor has it ever failed for steam on any part of the

road, although, on six trips, the run from Wapella to Amboy was made without shaking the grate-bars. It is a strong piece of evidence in favor of the success of the use of Illinois coal in locomotive engines, that the grates have not sprung or warped in the least, and are to-day as straight and as clean as if new.

"Here are the performances of several engines of the same class as the coal-burner, doing the same work, with wood, on alternate days.

"The figures are taken from the monthly report of fuel consumed by engines on this Division; the cost of wood being estimated at $4.35 per cord, and coal at $3 per ton:—

Wood-Engine.	Miles travelled.	Wood consumed.	Cost.
No. 57	1,320	49½ cords	$215.32
No. 39	1,526	65¾ „	286.01
No. 54	1,803	52½ „	228.37
No. 70	1,968	80 „	348.00
No. 65	2,062	89½ „	389.32
Coal, 51	2,082	38½ tons coal	115.50

"These engines are engaged on freight-train service between Amboy and Wapella, except No. 54, which is ditching, and Nos. 65 and 70, which run freights between Dunleith and Amboy.

"The loads drawn by these engines have averaged 15 loaded eight-wheeled cars, or a tonnage of 300,000 pounds each; and the cost of fuel per mile run has been as follows:—

	Miles run.	Cords of Wood.	Price per Cord.	Cost per Mile.
No. 57	1,320	49½	$4.35	16.31 cents.
No. 39	1,526	65¾	4.35	18.74 „
No. 54	1,803	52½	4.35	12.66 „
No. 70	1,968	80	4.35	17.68 „
No. 65	2,062	89½	4.35	18.88 „
No. 51	2,082	38½ tons coal, at $3.00		5.54 „

"From these figures, I institute the following comparisons, showing the saving to be made in the use of coal:—

No. 57 ran 1,320 miles, at a cost of	$215.32
No. 51 ran 1,320 miles, at a cost of	73.12
Saving in favor of coal	$142.20
No. 39 ran 1,526 miles, at a cost of	$286.01
No. 51 ran 1,526 miles, at a cost of	84.54
Saving in favor of coal	$201.47

"The coal used in No. 51 is from the upper vein of La Salle Mines, which seems to answer as well as that of the lower veins for locomotives; though the lower, for other purposes, is esteemed the best.

"The amount of cinders and dirt found in the fire-box, after a trip of 110 miles, is small; averaging say two bushels from 51⅛ bushels of coal, — the average of coal used per trip.

"In conclusion, I submit the above to your consideration, confident I shall be able to make a large reduction in the cost of fuel on my Division the coming year.

"I am, very respectfully,

"JAMES C. CLARKE,
"Division Superintendent Illinois Central Railroad."

It will be perceived, that, at $4.35 per cord for wood, and $3 per ton for coal, there was a saving of two-thirds the expense in favor of the coal-engine.

Experiments have recently been made, on the Boston and Worcester Railway, with the "Hecla," a wood-engine, altered to burn Cumberland coal, after a plan of the Franklin Locomotive Works.

A large saving in the cost of fuel was effected, with promise of more complete success hereafter. Trifling alterations would materially increase the efficiency of the engine.

The "Hecla" is an engine weighing 22½ tons: she was run exclusively with freight-trains. Estimating the cost of coal and wood at $7 per ton or per cord, the following results were produced: —

The average cost of wood per round trip between Boston and Worcester, with freight-trains, is $31\frac{6}{10}$ cents per mile. With the "Hecla," burning coal, the highest cost per round trip was $19\frac{66}{100}$ cents per mile; being a saving of $37\frac{78}{100}$ per cent in favor of coal.

The subjoined table shows the performance of the engine on her several trips: —

Experiments with the locomotive engine "Hecla," using bituminous coal, on the Boston and Worcester Railway, in May, 1856.

Starting from	Distance in miles.	No. of four-wheel cars.	Weight of Train.	Wood-kindling used per round trip.	Coal used per round trip.	Water used per round trip.	Coal used, up or down.	Water used, up or down.	Time used on road.	No. stops.	Average pressure.	Water evaporated to one pound fuel.	Water evaporated per hour.	Cost per mile in cents and parts.
			lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	h. m.		lbs.	lbs.	lbs.	
Boston	44¼	26	369,000	310.5	4810	30,911	2620	16,364	4 40	7	72	6.07	3914	19.01
Worcester	44¼	30½	319,000				2190	14,547	3 43	6	65	6.42	3506	16.09
Boston	44¼	24½	312,990	227	4190	26,777	2590	16,531	6 06	8	59	6.24	2710	18.62
Worcester	44¼	18	189,900				1600	10,246	4 11	6	59	6.18	2449	11.82
Boston	44¼	35	399,900	294	3800	27,420	2200	16,841	4 31	6	70½	7.40	3728	16.21
Worcester	44¼	10	129,090				1600	10,579	4 04	7	70	6.32	2601	11.98
Boston	44¼	23	269,900	211.6	5198	38,355	2398	16,531	4 39	7	85	6.75	3514	17.43
Worcester	44¼	35	419,000				2800	21,824	5 02	8	61	7.65	4336	20.27
Boston	44¼	34	370,000	255	4200	32,743	2610	19,519	4 31	8	79	7.30	4321	19.05
Worcester	44¼	22	239,000				1590	13,224	4 09	8	85	7.99	3187	11.90
Boston	44¼	38	420,900	225.7	4355	36,442	2980	24,870	5 49	8	65	8.20	4277	20.92
Worcester	44¼	23	199,000				1375	11,571	3 51	7	72	8.08	3005½	10.24
Boston	44¼	27	349,900	225.7	3737	25,459	2295	15,206	4 07	4	73	6.46	3694	17.13
Worcester	44¼	15	189,090				1442	10,253	3 56	5	82	6.84	2606	10.71

The experiments were not tried under the most favorable circumstances; for in the report of Gordon H. Nott, Esq., the engineer under whose supervision the trials were made, he states: —

"The fire was not managed with the same care as it was during previous trials:* there was not so much effort to clear the clinker from the sides and the grate-bars. In the first four trips, the coal was of a very inferior quality, as well as being more than ordinarily fine; upon the remaining trials, the coal was large and of a better quality, although there were some large lumps, with veins of slate. During these trials, there was a large portion of the time used in taking and leaving cars at the stations on the road, which required more fuel than if the train went over the road without changing.

"The furnace-door was not opened after firing, and the smoke

* Experiments previously conducted by Mr. Nott with the "Hecla" under a different plan.

from the chimney was quite light-colored. There was an instant, after the raw coal was added, when there was a cloud from the chimney; and this was not very black."

It is proper also to add, that, during these trials, on several occasions aid was rendered to other trains on the road.

Early in the present year, a passenger-engine, called the "Canute," constructed after plans by Mr. D. Beattie, for the purpose of burning coal, was run in England, on the London and South-western Railway, with great success.

The fire-box of this engine was furnished with a chamber formed of fire-brick. The consumption of smoke was said to be completely attained, and the evaporative power of the coal increased.

With an express passenger-train of $10\frac{1}{2}$ carriages, weighing 66 tons, a speed of 34 miles an hour, including stops, was attained, with a consumption of but 15 pounds of coal per train-mile. Water evaporated $9\frac{35}{100}$ pounds with a pound of coal.

With a train of 28 carriages, weighing 203 tons, a speed of $30\frac{3}{4}$ miles an hour was attained, with a consumption of $28\frac{3}{4}$ pounds of coal per mile. Water evaporated $8\frac{87}{100}$ pounds with a pound of coal.

In the "Canute," the feed-water was heated to boiling-point before entering the boiler; and the steam was also super-heated.

In England, in 1854, the evaporative powers of coal and coke were as 2 to 3, owing to an imperfect knowledge of the use of coal. By the improved method of combustion, coal is equally effective with coke.

Hence, the cost of coal and coke being as 2 to 3, there is a saving of one-third by the use of coal.

This apparently settles the question as to the practicability of using coal as a fuel for locomotives; for with coal at $6 per ton, and with a consumption of 15 pounds per mile, a train containing 250 people could be conveyed from Boston to Worcester at an expense for fuel of $1.80; whereas, with wood at $6 per cord, the cost of the same service would be about $7.

The experiments with the "Canute" not only demonstrated the practicability of using coal instead of coke, but also *that it was equally effective in producing steam.*

The average consumption of coke on English railways in 1855, on passenger and freight engines, having been thirty pounds per mile (twenty on passenger and thirty-eight on freight engines), the result of the foregoing demonstration proves, that, by adopting the improvements of the "Canute," and with coal at $6 per ton, even if the consumption per mile were not reduced below the average amount of coke used in England in 1855, the cost of fuel per train-mile would be but $8\frac{3}{100}$ cents. The average expenditure for fuel per mile upon the seven Boston railways, in 1855, having been $24\frac{43}{100}$ cents, it follows that a reduction to $8\frac{3}{100}$ cents for the same service would be equivalent to a saving of $16\frac{4}{10}$ cents per mile, or more than 67 per cent.

But the additional improvements on the "Canute" reduced the consumption of coal on a passenger-train,

in one instance, to 15 pounds per mile; thus reducing the cost to four cents per mile.

The following table shows the result of experiments recently tried on the Providence and Worcester Railroad with the "Slater," a coal-burning locomotive built by William Mason and Company, of Taunton, with "Boardman's patent boiler;" and the "Grafton," a wood-burning locomotive built by the Taunton Locomotive Manufacturing Company, — both freight-engines. Experiments made from Aug. 15 to Sept. 2, 1856, inclusive: —

Route, from Providence to Worcester, and return.

Distance, 90 miles.

Maximum grade, 27 feet per mile for 4,300 feet.

Total curvature, 2,456° 30′.

Shortest radius, 716 feet for 875 feet.

The cost of wood or coal assumed to be $6 per cord, or per ton of 2,240 pounds.

Comparative result of experiments with wood-burner "Grafton" and coal-burner "Slater," the latter burning Cumberland coal.

Name of engine.	Character.	Miles run.	Useful load.	Dead weight.	Total weight.	Weight of trains, average of 8 trips.
			Tons.	Tons.	Tons.	Tons.
Grafton	Wood	720	$1137\frac{35}{100}$	1119	$2256\frac{35}{100}$	282
Slater	Coal	720	$1094\frac{375}{1000}$	1043	$2137\frac{375}{1000}$	267

Name of engine.	Fuel used.		Water evaporated.	Water evaporated to a lb. of fuel.	Pressure of steam to square inch.	Cost of fuel per train-mile.	Total cost of fuel.
	Coal.	Wood.					
	Tons.	Cords.	Pounds.	Pounds.	Pounds.	Cents.	
Grafton		46				$38\frac{1}{3}$	$276
Slater	$17\frac{1}{12}$	1	299,880	$7\frac{87}{100}$	100	$15\frac{6}{1000}$	$108.05

Saving on coal-burner, $60\frac{4}{5}$ per cent.

The consumption of wood on the "Grafton," in the trial here mentioned, having been larger than usual, the wood-burning locomotive "Orray Taft," constructed by Corliss, Nightingale, and Company, of Providence, R.I., was run against the "Slater," with the following result. Trial made with the "Orray Taft" from Sept. 25 to Oct. 3, 1856.

Comparative result of experiments with coal-burner "Slater" and wood-burner "Orray Taft."

Name of engine.	Character.	Miles run.	Useful load.	Dead weight.	Total weight.	Weight of trains, average of 8 trips.
			Tons.	Tons.	Tons.	Tons.
Slater	Coal	720	$1094\frac{375}{1000}$	1043	$2137\frac{375}{1000}$	267
Orray Taft	Wood	720	$1128\frac{32}{100}$	$1224\frac{4}{10}$	$2352\frac{72}{100}$	$294\frac{8}{100}$

Name of engine.	Fuel used.		Water evaporated.	Water evaporated to a lb. of fuel.	Pressure of steam to square inch.	Cost of fuel per train-mile.	Total cost of fuel.
	Coal.	Wood.					
	Tons.	Cords.	Pounds.	Pounds.	Pounds.	Cents.	
Slater	$17\frac{1}{112}$	1	299,880	$7\frac{87}{100}$	100	$15\frac{6}{1000}$	$108.05
Orray Taft		$39\frac{1}{2}$				$32\frac{91}{100}$	$237

Saving on coal-burner, $54\frac{4}{10}$ per cent.

The "Slater" was the first coal-burner built by William Mason and Company. She has been running constantly for the past year on the Providence and Worcester Railroad, and has given entire satisfaction. During the year ending October 24, 1856, she ran 24,726 miles. There has been no expenditure on her boiler; and her grate-bars are the same originally put in. A recent thorough examination of her fire-box developed not the slightest evidence of failure.

On her trial-trip, she ran from Providence to Worcester, and back (90 miles), with the ordinary passenger-train, made 36 stops, and remained an hour and a half in Worcester. Coal consumed, 2,300 pounds. *Eight and a half* pounds of water evaporated to a pound of fuel.

Assuming the cost of coal to be $6 per ton, the cost of fuel per mile was $6\frac{84}{100}$ cents.

After a most thorough trial of the "Slater," her builders have recently received an order for another coal-burner from the managers of the Providence and Worcester Railroad Company. Since the construction of the "Slater," Messrs. William Mason and Company have built the "Phœnix," now being run by the New-Jersey Railroad and Transportation Company.

During the week ending Aug. 16, 1856, this engine run 655 miles with a heavy passenger-train, averaging 9 and 10 long cars each trip. The total consumption of fuel was 6 tons 2 cwt. of coal and 1 cord of wood. This includes all the fuel used on the engine, not merely that consumed while on the road.

At $6 per ton and per cord for coal and wood, the cost of fuel per mile on the "Phœnix" was $6\frac{1}{2}$ cents.

She ran $92\frac{1}{4}$ miles with a ton of coal, and $\frac{1}{65}$ of a cord of wood.

A letter describing the "Phœnix" closes with these words: "This engine runs with as much ease and comfort to the engineer as a wood-engine, and with much less annoyance to passengers. She makes no smoke, gas, or sparks."

It is confidently believed that the introduction

of these coal-burners upon Boston railways would be productive of an annual saving of more than $400,000.

Whatever results may have been attained by other builders, the success of William Mason and Company is clear and decided; and it is believed that there are not on record results so satisfactory as are herein recorded of the well-authenticated performances of their locomotives.

But it should be borne in mind, that the mere saving in the cost of fuel is not the only advantage to be gained by the substitution of coal for wood.

It would bring into profitable use a great extent of valuable property now occupied solely for the storage of the vast supplies of wood that the several companies are obliged to keep constantly on hand.

The number of fuel-stations could be reduced; because a tender could easily carry a supply of coal sufficient for a route of 100 miles.

The comparatively small quantity of wood that railways must necessarily consume could be purchased at a reduced price; and the tariffs which self-preservation has compelled railway companies to affix upon wood could be so far reduced as to add to their freight-list a new and profitable article for transportation.

These are some of the advantages to be gained by the introduction of coal.

A perpetual investment in fuel of from $25,000 to $100,000 by each of the corporations is now necessary, because old and dry wood alone can be consumed with any degree of economy. This involves the

necessity of a large supply. Upon these heavy investments, the several corporations lose annually a large sum in interest; to say nothing of the amount paid for insurance, nor of the loss and inconvenience arising from the destruction of their wood and sheds by fire.

All these evils would be avoided by the introduction of coal.

The immense increase in the consumption of wood by locomotive-engines is so rapidly destroying our forests, that it will not long remain a matter of inclination merely, but one of necessity, that coal should be substituted therefor. The constantly increasing cost of fuel, otherwise inevitable, would at once be arrested by the use of coal; the inexhaustible supply of which will remove at once the fears, often expressed by some railway-managers, that roads relying solely upon wood for their fuel must ultimately become worthless, from an utter inability to obtain that hitherto indispensable article.

It would seem that a careful perusal of the foregoing well-authenticated results of experiments with coal-burning locomotives justifies the declaration, that a saving of 50 per cent in the cost of fuel on Boston railways may reasonably be expected.

Let us see what results would follow such saving.

The expenditure for fuel on Boston railways, in 1855, amounted to $711,773.39. A saving of 50 per cent would amount to $355,886.69. At par, the capital stock of the seven railways terminating in Boston amounts to $23,546,300. The saving in the

cost of fuel, by introducing coal-burning engines, would be equivalent to a dividend of $1\frac{51}{100}$ per cent on the entire capital stock; this, added to net earnings in 1855, as per Legislative returns, would have brought net revenues up to $8\frac{1}{2}$ per cent on the share capital. These facts point clearly to the introduction of coal-burning locomotives upon our Boston railways as *the only alternative;* and, the sooner it is accepted, the better it will be for railway stockholders and for the public.

HAVE EXPENSES REACHED THEIR MAXIMUM?

Fuel, iron, sleepers, labor, and oil constitute the chief items of expense in operating railways. The introduction of coal as a fuel, and the inexhaustible supply of that article, will dispose of the first item.

Greater care in the selection of the best quality of iron, and the introduction of lighter engines, will reduce the expense of the second item.

The adoption of the comparatively indestructible sleepers of kyanized spruce and hemlock will lessen the outlay for the third item.

A better system of discipline, and consequently more advantageous employment of labor, must be relied upon to diminish charges on the fourth item; for it is not desirable that the present price of labor should decline. Employees should be well paid, and of the best class.

Greater economy in the use of oil is practicable; and there is every reason to believe that the maximum cost of this article has been attained.

CONCLUSION.

I have thus endeavored to show, —

1st, That Boston railways have been of great benefit to the community.

2d, That they have received, and are receiving, a fair return for the capital invested.

3d, That they have not been, and are not now, managed with the greatest practicable economy.

4th, That tariffs have not been properly discriminative; that high and low fares have not been, and are not now, properly applied.

5th, That expenses have reached their maximum, and can be much reduced.

6th, That the business of railways can be largely increased with but trifling outlay.

All will agree, that there is a rate of tariff to be applied to railways that would virtually amount to prohibition;

That, the lower the tariff, the larger will be the business of a line;

That a large amount of business can be done cheaper, *pro rata*, than a smaller amount;

That there is a point below which no railway can afford to run;

That this "point" is affected by numerous contingencies;

And that railway directors owe it to themselves, the stockholders, and the community, to insist upon the practice of the truest economy on their several roads.

There can be but little doubt that the true reasons why Boston railways do not earn larger dividends, are, —

Because they are not managed with true economy;

Because through freight and travel do not pay remunerative rates;

And because local traffic, not being sufficiently encouraged, is not nearly so large as it can be made.

It appears by table A, at the end of this pamphlet, that, notwithstanding the multiplication of lines, each road has steadily increased its receipts.

Does any one believe that the population and business of the State of Massachusetts will now remain stationary, after an increase almost unbroken for more than two hundred years?

Is there a man who supposes that the receipts of Boston railways will remain at their present point, after an increase steadily continued for twenty years?

Heretofore, each road has increased its income in spite of new and competing lines; but there need be no fear of other rivals for the business within fifty miles of Boston. That territory is already covered with a close network of rails, all contributing to the seven Boston roads.

No well-grounded cause exists for the present depressed market-value of Boston railways. The present

real value of their shares, as dividend-earning securities, is far above that attached to them in State Street; and, prospectively, no investment presents a greater certainty of ample return than is offered by Boston railways.

APPENDIX.

RAILWAY REPORTS.

It is to be desired that a better form of Railway Legislative Returns were adopted, and that the Annual Reports of directors to stockholders were more complete. Both are meagre and unsatisfactory; neither giving stockholders a precise idea of the situation of their property, nor serving as a guide to directors for their future labors.

Most of the tables in the preceding pages were gleaned from legislative returns, in which the important facts were buried under such a mass of useless figures that it required much time and labor to exhume them.

A system is required that will be less irksome to railway officials, and at the same time better serve the purpose intended.

REDUCING EXPENSES.

Within a few weeks, a notable plan has been suggested, which it is supposed will materially reduce expenses, and add largely to dividends.

It is proposed to withdraw railway advertisements from the newspapers, and, in lieu thereof, issue certain monthly publications containing the order of running of the several roads. These publications are to be printed at the rate of twelve dollars and fifty

cents per thousand; the expense to be borne conjointly by the several roads. If any corporation during the month change their time-tables, the expense of a new issue of tables is to be paid by such corporation.

It is apparent, that, while this change would not incommode the public, the saving thus effected would amount to a very considerable sum, — possibly to $\frac{1}{150}$ part of one per cent upon the aggregate capital of the united corporations.

It would doubtless be politic on the part of stockholders to add to the salary of that person, who first suggested this happy idea, the amount of money thus saved, in order to promote increased vigilance on the part of railway officials, and to reward the ingenuity manifested in this extremely judicious plan.

THE RAILWAY SYSTEM OF THE UNITED STATES.

Few people have any just conception of the magnitude of the railway system in the United States.

Next to agriculture, it is the chief interest. It exceeds navigation twofold.

Twenty-three thousand miles of railway are in operation, and 10,000 miles under construction, — 33,000 miles in all, or more than sufficient to encircle the globe. The capital invested is more than *eight hundred millions of dollars!* It requires 8,250 locomotives and 66,000 cars to equip the railways of the nation. Each engine, with its tender, occupies about thirty-six feet of track, and each car at least thirty feet. If engines, tenders, and cars were placed in continuous line, they would form a grand train four hundred and thirty-one miles long.

If the proportionate mileage be half that on Boston railways in 1855, it amounts annually to 107,250,000 miles, — a distance greater than that between the earth and the sun. The daily mileage is equal to a journey eleven times round the earth. A saving of ten cents per mile on this vast mileage amounts to $11,000,000 per annum. When it is considered that this sum is lost to the public, the interest of the community in the economical management of railways is apparent.

The force directly engaged in operating railways amounts to at least 150,000 men. The number employed in constructing and operating railways, and in the manufacture of railway materials, is not less than 500,000 men. The number of persons directly dependent upon railways exceeds 1,000,000.

The railway system is a potent instrument of civilization, and a strong bond of union between people of otherwise conflicting interests. It opens to industry territories otherwise uncultivated. It enlarges the capabilities of production, and consequently increases wealth. In connection with the electric telegraph, it extends our power as a military nation. It affects the interests and social relations of all within our borders. Nor is its wide-spread influence confined to our own land: it is co-extensive with civilization. Its magic influence presents this paradox: —

While it scatters population, and enlarges the domain of cultivation, it brings the people into closer contact, and distant places into proximity. Diffusing, it concentrates; expanding, it contracts.

Whatever has been its pecuniary success, badly managed as it is, and lacking a proper organization, it cannot be denied that the country at large has derived great benefit from the progress of the Railway System in the United States.

Table A.

Gross receipts of seven Boston Railways, from 1835 *to* 1855 *inclusive.*

Year.	Boston and Lowell.	Boston and Maine.	Boston and Providence.	Boston and Worcester.	Eastern.	Fitchburg.	Old Colony and Fall River.
1835 . . .	$45,529.03		$106,929.88	$161,805.95			
1836 . . .	135,327.32		243,095.62	183,286.03			
1837 . . .	180,770.04		250,883.66	210,048.33			
1838 . . .	191,778.57		265,115.15	212,325.03	$37,422.36		
1839 . . .	241,219.94		313,907.04	231,807.18	125,623.15		
1840 . . .	231,575.27		202,601.06	267,547.41	199,134.50		
1841 . . .	267,541.34		230,821.03	310,807.87	299,574.13		
1842 . . .	278,310.68	$155,880.69	236,467.91	349,206.66	269,168.72		
1843 . . .	277,315.06	178,744.99	233,388.01	383,367.10	284,184.75		
1844 . . .	316,909.58	233,101.04	283,701.18	428,437.34	353,244.18	$42,759.36	
1845 . . .	356,067.67	287,063.10	350,628.97	474,855.53	363,216.23	203,996.36	
1846 . . .	384,102.29	349,136.56	360,875.03	554,712.46	371,338.61	286,645.36	
1847 . . .	448,555.90	511,404.86	363,328.37	722,170.32	424,840.83	390,736.97	
1848 . . .	461,339.35	511,627.95	354,375.43	716,284.11	479,157.89	486,265.63	
1849 . . .	461,488.00	522,335.51	354,331.60	703,361.15	517,929.17	493,060.43	
1850 . . .	406,421.00	594,963.45	370,727.26	757,946.79	539,076.43	551,607.13	
1851 . . .	409,152.88	633,095.15	377,396.57 *	743,922.60	502,054.53	516,012.76 *	
1852 . . .	388,108.37	661,521.63	429,484.34	758,819.47	488,973.31	574,574.36	
1853 . . .	434,599.99	803,024.14	508,326.59	887,219.87	620,810.90	626,679.73	
1854 . . .	442,491.65	906,790.28	544,829.85	952,894.98	730,269.58†	704,638.63	$649,656.14
1855 . . .	489,754.85	854,425.96	558,671.25	1,008,005.00	647,280.75 *	681,162.52	653,499.32

* Eleven months.

† Including $111,500 for property sold.

TABLE B.

Boston and Lowell.

Year.	Cost of Road.	Gross Receipts.	Net Receipts.	Miles run.	Passengers.	Tons Frt.
1850.	$1,945,646.68	$406,421.00	$148,536.97	235,995	558,993	231,874
1851.	1,945,646.68	409,152.88	141,123.21	250,558	569,784	249,468
1852.	1,995,249.02	388,108.37	130,881.04	247,362	541,531	246,330
1853.	2,044,536.15	434,599.99	114,098.34	275,681	657,391	342,629
1854.	2,158,932.89	442,491.65	104,175.12	286,458	604,706	325,960
1855.	2,188,595.25	489,754.85	123,634.78	295,517	574,614	288,836

Boston and Maine.

Year.	Cost of Road.	Gross Receipts.	Net Receipts.	Miles run.	Passengers.	Tons Frt.
1850.	$4,021,606.29	$594,963.45	$285,057.11	468,590	1,221,071	143,673
1851.	4,090,452.48	633,095.15	328,026.75	461,856	1,449,421	156,700
1852.	4,092,926.58	661,521.63	338,215.42	503,663	1,465,924	193,908
1853.	4,111,345.82	803,024.14	418,358.41	516,328	1,820,752	251,327
1854.	4,179,535.16	906,790.28	421,561.34	569,189	1,969,464	384,784
1855.	4,179,546.19	854,425.96	330,059.52	583,016	1,869,352	245,717

Boston and Providence.

Year.	Cost of Road.	Gross Receipts.	Net Receipts.	Miles run.	Passengers.	Tons Frt.
1850.	$3,416,232.51	$370,727.26	$208,797.00	251,950	591,949	104,203
1851.*	3,469,599.38	377,396.57	199,620.40	252,927	611,020	121,320
1852.	3,546,203.89	429,484.34	212,625.42	283,920	672,122	129,482
1853.	3,576,041.41	508,326.59	226,639.47	305,734	748,051	142,126
1854.	3,611,821.65	544,829.85	209,126.08	330,590	852,270	149,540
1855.	3,667,154.31	558,671.25	195,485.17	316,238	874,178	142,121

* Eleven months.

Boston and Worcester.

Year.	Cost of Road.	Gross Receipts.	Net Receipts.	Miles run.	Passengers.	Tons Frt.
1850.	$4,882,645.23	$757,946.79	$353,607.98	436,199	1,001,989	252,253
1851.	4,862,748.00	743,922.60	329,813.33	466,523	1,100,720	242,789
1852.	4,845,966.99	758,819.47	331,296.79	478,819	1,185,371	257,657
1853.	4,850,754.70	887,219.87	413,289.83	513,580	1,460,011	309,715
1854.	4,856,370.84	952,894.98	342,129.24	551,847	1,608,602	324,989
1855.	4,865,439.03	1,008,005.00	391,261.39	541,528	1,590,459	328,806

TABLE B (*continued*).

Eastern.

Year.	Cost of Road.	Gross Receipts.	Net Receipts.	Miles run.	Passengers.	Tons Frt.
1850.	$3,120,391.67	$539,076.43	$317,415.88	311,004	1,006,552	71,586
1851.	3,120,391.67	502,054.53	277,455.32	318,900	993,256	61,952
1852.	3,120,391.67	488,973.31	241,017.39	311,964	1,004,991	81,027
1853.	3,120,391.67	620,810.90	310,875.05	355,159	1,099,418	102,617
1854.	4,447,459.99	730,269.58	346,425.05	390,560	1,181,514	118,013
1855.*	4,621,016.50	647,280.75	162,739.78†	316,186	958,480	82,684

* Eleven months.
† Net earnings, after deducting working expenses $305,997.47
Interest on debt 143,257.69

Fitchburg.

Year.	Cost of Road.	Gross Receipts.	Net Receipts.	Miles run.	Passengers.	Tons Frt.
1850.	$3,552,282.59	$551,607.13	$294,523.33	375,424	1,080,286	328,258
1851.*	3,612,486.97	516,012.76	205,635.80	371,899	1,261,159	333,713
1852.	3,633,673.57	574,574.36	232,787.32	425,365	1,214,755	427,372
1853.	3,716,870.10	626,659.73	214,633.66	461,599	1,269,675	430,606
1854.	3,730,965.47	704,638.63	272,715.80	505,034	1,262,600	478,606
1855.	3,765,998.19	681,162.52	213,837.81	451,944	1,049,757	449,804

* Eleven months.

Old Colony and Fall River.

Year.	Cost of Road.	Gross Receipts.	Net Receipts.	Miles run.	Passengers.	Tons Frt.
1854.	$3,362,948.60	$649,656.14	$142,800.80	389,203	1,282,610	236,297
1855.	3,362,948.60	653,499.32	276,365.70	408,107	1,194,190	147,824

NOTE. — On page 56, twenty-second and twenty-third lines, "45" should read "50." The number of miles given refers to the length of *iron*. The length of *track* to be laid with a thousand tons would, of course, be half that amount; viz., —

With 50 lb. rail, $25\frac{45}{100}$ miles of iron, or $12\frac{72}{100}$ miles of track.
„ 70 „ $18\frac{18}{100}$ „ „ $9\frac{9}{100}$ „ „